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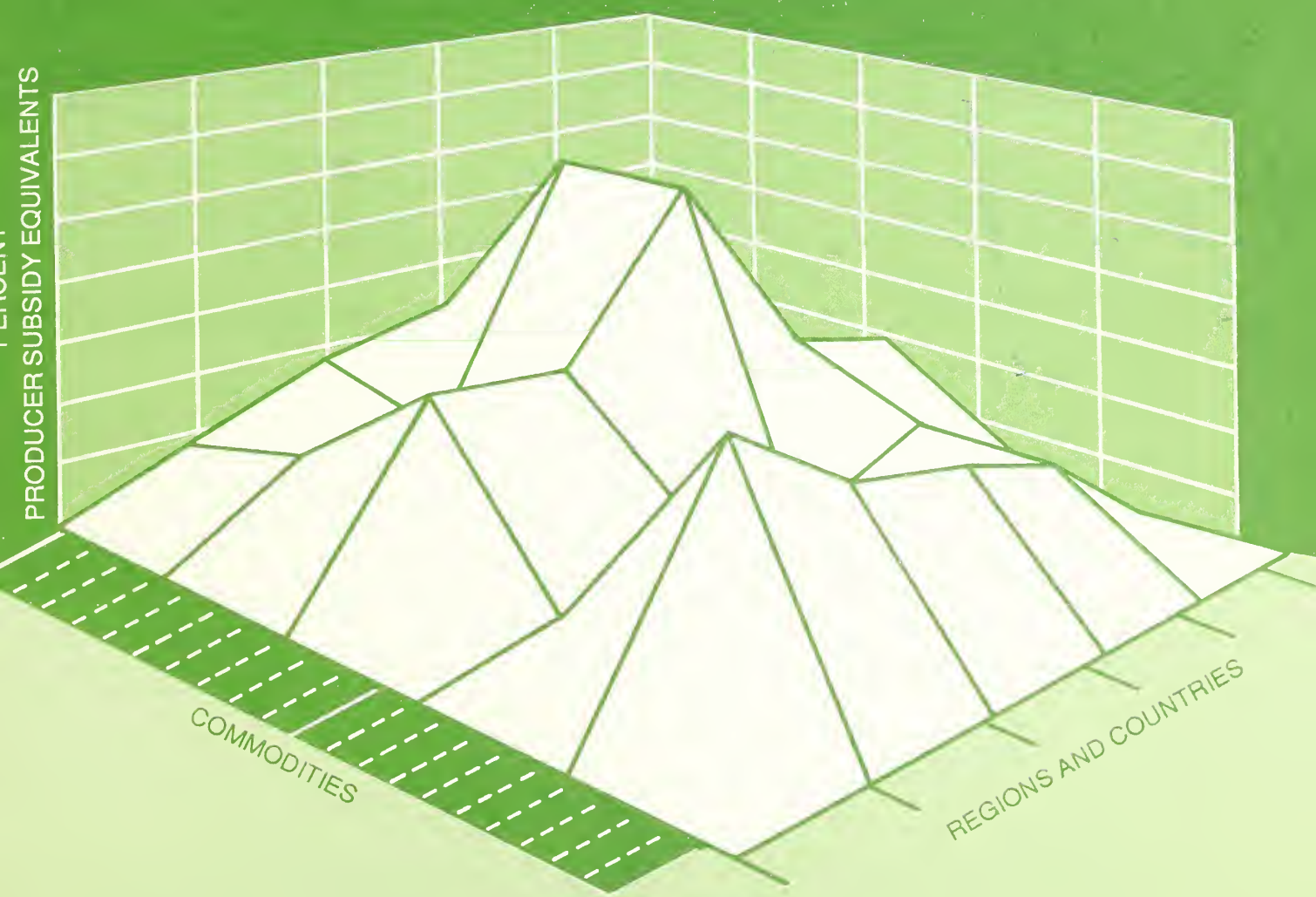
How Level is the Playing Field?

An Economic Analysis of Agricultural Policy Reforms in Industrial Market Economies

Vernon O. Roningen
Praveen M. Dixit



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HOW LEVEL IS THE PLAYING FIELD?: AN ECONOMIC ANALYSIS OF AGRICULTURAL POLICY REFORMS IN INDUSTRIAL MARKET ECONOMIES. By Vernon O. Roningen and Praveen M. Dixit, Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture. Foreign Agricultural Economic Report No. 239.

Abstract

An 11-region, 22-commodity world net trade model reveals that elimination of protectionist agricultural policies in industrial market economies would drive up world prices for most commodities. The increases would be closely related to the levels of government assistance. Government assistance to agricultural producers is highest in Japan, followed by the European Community and the United States. The analysis also indicates that the United States would improve its agricultural balance of trade, while the European Community and Japan would face considerably larger trade deficits. All three economies, however, would experience income gains from liberalization, indicating that policies used by these three economies to transfer resources between the farm and nonfarm sectors are inefficient.

Keywords: Multilateral trade liberalization, agricultural policy reform, producer subsidy equivalent (PSE), consumer subsidy equivalent (CSE), SWOPSIM, economic welfare.

Acknowledgments

A word of thanks to Carol Stillwagon for her help in manuscript preparation and to Teri Davis Thrash for editorial assistance.

1301 New York Avenue, NW.
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December 1989

A NOTE OF CAUTION TO THE READER

ERS is conducting a program of research and analysis (some of which is reported in this paper) in an effort to improve the understanding of likely impacts of trade liberalization. However, we caution the reader that the preliminary results reported in this paper are not forecasts of the impacts of trade liberalization implemented at some time in the future. Reported results were obtained in a comparative statics framework and, thus, are an attempt to simulate what a historical period (1986 in this report) would have looked like with a different set of policies in effect--all other conditions unchanged--after full adjustment had occurred. Models used are also partial (considering the agricultural sector in isolation) and thus unable to capture intersectoral adjustments. It is also important to note that trade liberalization in this analysis is interpreted as instantaneous removal of all forms of support (all assumed to be equally distorting) to agriculture and therefore is not an accurate representation of any of the proposals before the GATT). No proposal tabled at GATT calls for the elimination of all support to agriculture or all agricultural programs. Rather, the proposals concentrate on reforming country policies to remove, over time, those policies which are trade distorting.

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Associate Administrator, ERS

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Summary

An 11-region, 22-commodity world net trade model reveals that elimination of protectionist agricultural policies in industrial market economies would drive up world prices for most commodities. The increases would be closely related to the levels of government assistance. Government assistance to agricultural producers is highest in Japan, followed by the European Community and the United States. The results also indicate that the United States would improve its agricultural balance of trade, while the European Community and Japan would face considerably larger trade deficits. All three economies, however, would experience income gains from liberalization, indicating that policies used by these three economies to transfer resources between the farm and non-farm sectors are inefficient.

Extending the applications of our modeling efforts allowed us to conclude the following:

Producer Support Profile

- Japan supports its producers the most, followed by Other Western Europe, the EC, Canada, and the United States. Australia and New Zealand have the lowest levels of government assistance to agricultural producers.

- The distribution of producer support costs between consumers and taxpayers varies widely among countries. Policies that raise consumer prices account for a majority of the support in the EC and Japan, but only a small proportion of support is maintained through such policies in the United States, Canada, Australia, and New Zealand.

- The rankings of overall support across countries did not vary much between marketing years 1984-85 and 1986-87, but there were substantial changes in the mix of support within countries. In the United States and the EC, for instance, the support to grain producers compared with that for livestock producers rose greatly between 1984-85 and 1986-87.

Effects on World Prices

- Elimination of all subsidies to agriculture in industrial market economies under 1986-87 market conditions would raise world prices for most commodities. The rise in prices would be greatest for dairy products, followed by sugar, wheat, and rice. World prices for ruminant meat would also increase moderately.

- Increases in world prices would be much higher under 1986-87 market conditions than under 1984-85 conditions. The relative price increases in 1986-87 would be especially large for wheat, coarse grains, and rice.

- The EC and the United States contribute the most to world price changes. The price effects of EC policies have been most visible in dairy, wheat, and ruminant meat markets. U.S. policies have had the most effect on the world sugar price.

- Assistance to agriculture is high in Japan, but its policies do not have much influence on international prices because Japan is not a major participant in world agricultural markets. The rice market is

the only exception. Japan's policies affect the world rice price more than the combined effects of all other industrial countries.

Effects on World Trade

- Agricultural trade for most commodities would expand if industrial market economies simultaneously liberalized their trade. The largest increases would be in rice and sugar trade. World wheat trade would decline modestly because of the elimination of export subsidies.

- Following multilateral trade liberalization, the United States would improve its agricultural balance of trade by $3 billion. Most of this improvement would result from decreases in beef import costs and increases in grain export revenues because of rising world prices.

- The EC and Japan would face considerably larger agricultural balance-of-trade deficits, while developing countries, on the aggregate, would lower their import costs by nearly $6 billion.

Effects on Domestic Production and Incomes

- Multilateral elimination of support would reduce production of most agricultural commodities in industrial market economies. The decline in production for a liberalizing country would be more under unilateral liberalization than under multilateral liberalization.

- Producer income losses in the United States, the EC, and Japan are likely to range from $15-$25 billion with multilateral elimination of agricultural support unless some type of nontrade-distorting compensation is provided. The impacts would be greatest on rice producers in Japan, ruminant meat producers in the EC, and grain producers in the United States. While this analysis shows that world price increases arising from free trade would not be sufficient to offset loss of distortionary government support, U.S. farm income could be maintained at pre-reform levels through nondistortionary support with nearly 50 percent lower government expenditures.

- While the losses in producer income may appear large, such losses would be even greater if Japan, the EC, and the United States unilaterally undertook the same type of policy reform. U.S. producer losses would be cut by almost 40 percent under multilateral liberalization, while losses in the EC would be nearly 30 percent lower. This suggests that if producers are to be compensated during the transition to freer trade, the payment required would be much less under multilateral reform. Producers in Japan would lose about the same under either condition.

Effects on Economic Welfare

- For every dollar that producers lose because of multilateral liberalization, consumers gain much more. Consumers and taxpayers in industrial market economies gain $1.42 in transfers for every dollar that producers lose. The transfer gains are slightly lower for the United States, but are greater for the EC and Japan.

Multilateral liberalization would generate income gains of about $6 billion for Japan, $9 billion for the United States, and $14 billion for the EC. On a per capita basis, New Zealand would gain the most.

The welfare implications for developing countries are rather complex. While developing countries that are net food exporters, such as Argentina and Brazil, would benefit from rising world prices, developing countries that are net food importers could experience welfare losses because of rising import costs.

How Level is the Playing Field?

An Economic Anaysis of Agricultural Policy Reforms in Industrial Market Economies

Vernon O. Roningen
Praveen M. Dixit

Introduction

Government intervention in the agricultural sector has been pervasive in nearly every country in the world. This intervention includes policy measures, such as price and income supports, supply controls, and barriers to trade or export incentives, and appears to significantly distort the location of production and trade. While these distortionary measures were not a major concern in the 1970's, when international agricultural trade grew rapidly, a world recession in the early 1980's considerably changed the picture. Growth in the global consumption of agricultural products slackened, while production kept expanding in response to technological advances and continued assistance to agriculture in developed countries. Many exporting countries were left holding large surpluses of commodity stocks, and escalating costs of domestic farm programs became even more worrisome.

Global expenditures on domestic farm programs nearly doubled during the first 5 years of the 1980's. In 1986 alone, the United States and the European Economic Community (EC) each spent nearly $25 billion on farm programs. Competitive efforts to export the surplus in shrunken world markets made the situation worse, depressing international commodity prices, globally exacerbating the farm crisis, and creating trade tensions among countries.

Tensions were especially high between the United States and the EC. Each accused the other of using unfair trade practices to bolster exports, particularly grain exports. The risk of an international farm subsidy war increased further when the enlargement of the EC to include Spain and Portugal sharply reduced prospects for future U.S. corn and sorghum sales. The EC's offers of compensation were considered inadequate, and the United States threatened retaliation against EC food and beverage sales. The EC responded with threats to counterretaliate against U.S. exports of rice and corn gluten feed (Paarlberg, 1988).

The United States and the EC were not the only countries embroiled in a trade dispute. Canada, upset over high deficiency payments to U.S. corn producers, imposed countervailing duties on imports of U.S. corn. The Australians, angered over U.S. and EC trading practices, coalesced 13 self-proclaimed nonsubsidizing countries into the Cairns Group of Fair Traders in Agriculture. The risk of a farm trade war was clearly increasing.

The possibility of escalating this conflict, combined with increased budgetary costs to support protectionist farm policies, brought agriculture to the top

of the international economic policy agenda. At the September 1986 Ministerial Meeting of the General Agreement on Tariffs and Trade (GATT) held in Punta del Este, Uruguay, an agreement was reached to give agriculture the highest priority in the next round of multilateral trade negotiations (MTN). The Ministerial Declaration (GATT, 1986) that launched a new round of international trade negotiations, called the the Uruguay Round, emphasized the "urgent need to bring more discipline and predictability to world agricultural trade by correcting and preventing restrictions and distortions ... so as to reduce the uncertainty, imbalances, and instability in world agricultural markets." The declaration also drew up three broadly stated objectives: (1) improve market access through the reduction of import barriers; (2) increase discipline on the use of all subsidies and other measures affecting agricultural trade; and (3) minimize the adverse effects that health and sanitary regulations can have on agricultural trade.

In July 1987, the United States presented its proposal for the Uruguay Round, calling for member countries to completely phase out over a 10-year period all policies that distort agricultural trade. The Cairns Group later tabled a similar proposal. In October 1987, the EC put forth its two-stage proposal to manage exports of major internationally traded commodities in surplus and to gradually reduce support to agriculture while maintaining the broad features of the Common Agricultural Policy (CAP).[1]

Negotiations in agriculture are likely to be difficult and acrimonious. The process could be made easier, however, if negotiators have a good understanding of how government intervention in agriculture has affected world commodity markets. A number of studies have already been completed that document the potential economic implications of agricultural policy reform. This report adopts the methodology used by two such studies, the Organization for Economic Cooperation and Development's (OECD) Trade Mandate Study (OECD, 1987) and the World Bank's World Development Report 1986, to provide updated and more comprehensive answers to questions that may arise during the negotiations.

This report focuses on three specific issues: (1) how levels of assistance to agriculture compare across countries and commodity markets; (2) how assistance to agriculture in industrial market economies has distorted world production and trade, and which countries have contributed the most to these distortions; and (3) who would benefit from the elimination of assistance to agriculture in industrial market economies.

The report first presents empirical estimates of aggregate support measures known as producer subsidy equivalents (PSE's) and consumer subsidy equivalents (CSE's). The report then provides a brief description and validation of the world agricultural net trade model used in the study. The distortionary effects of industrial market economies' policies on world agricultural markets, the quantification of economic costs associated with policies of individual market economies, and the likely market effects of simultaneously eliminating such assistance are described next. The report concludes with an assessment of the strengths and weaknesses of the analysis and the conditions under which the potential economic implications could differ.

1/ Additional information on the various GATT proposals can be found in Rossmiller (1988).

Agricultural Support Across Industrial Market Economies

The policies and programs used to support agriculture are often complex and diverse across commodities and countries. A measurement methodology in the form of producer and consumer subsidy equivalents has been a major practical step in understanding and quantifying these measures. These measures allow the direct comparison of a broad range of policies within a simple measure (OECD, 1987).

A PSE is the level of subsidy that would be necessary to compensate producers for the removal of government programs affecting a particular commodity (Josling, 1981).[2] The PSE represents the value of government support to producers, but is not a measure of distortions in domestic or world trade. The PSE for a particular commodity is positive when the net effect of all programs affecting that commodity in a country increases producers' incomes over what they would be in the absence of these programs, and is negative when the net effect of all programs reduces producer incomes.[3] The PSE, in percentage form, allows comparison of support to producers across commodities and countries.

A CSE is the level of subsidy that would be necessary to compensate consumers for the removal of government programs. The CSE for a particular commodity is negative when the net effect of all programs affecting that commodity in a country increases the price consumers pay for food, and positive when consumers pay less for food than they would in the absence of these programs.[4] The CSE summarizes the extent to which support to producers is paid by an implicit tax on consumers through higher food prices.

PSE's and CSE's can be expressed in at least three ways (OECD, 1987, p. 104): (1) as the total value of assistance to the commodity produced or consumed; (2) as the total value of assistance per unit of the commodity produced and consumed; and (3) as the ratio of the total value of assistance to total receipts, which is value of production or consumption, including any direct net receipts. Table 1 shows the PSE and CSE levels for the base year 1986-87

2/ The measurement methodology described by Josling (1981) implicitly assumes a small-country case where policies of a country cannot influence world prices.

3/ The PSE's, as presently calculated, do not include forgone income resulting from policies that control supply, such as acreage reduction programs in the United States, or the effects of policies on intermediate product prices, such as the tax effect on the livestock sector caused by policies that raise feed prices. Suggestions have been made that PSE's be adjusted such that producers receive credit for supply control efforts already underway (Rausser and Wright, 1987 and McClatchy, 1987), as countries were given credit in previous GATT negotiations for unilaterally reducing tariffs.

4/ The CSE estimates used in this report do not include subsidies such as U.S. food stamps or school lunch programs. Details on terminology and methodology used in estimating the PSE's and CSE's can be found in USDA (1987) and USDA (1988). These reports also provide comprehensive details on the limitations of this approach.

by country or region, for selected commodities using the ratio of assistance to total receipts. The weighted average PSE for all commodities indicates that, among the industrial market economies, Japan supports its producers the most, followed by Other Western Europe (non-EC), the EC, Canada, and the United States (fig. 1). Australia and New Zealand have the lowest level of producer support among the industrial market economies studied. Indeed, the world agricultural playing field is not very level.

Figure 2 compares the level of support for meats, dairy, and grains in the United States, the EC, and Japan, the three major participants in the upcoming GATT negotiations. The illustration shows that the rates of support in all

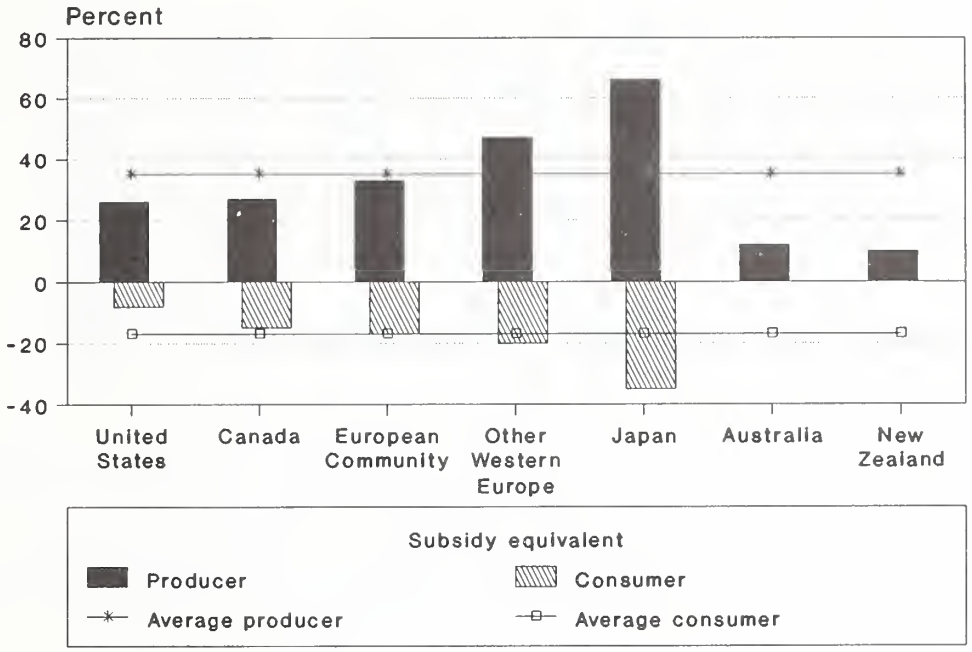
Table 1--Producer and consumer subsidy equivalents by country or region and commodity groups, 1986-87

Commodity group 1/	United States	Canada	EC	Other Western Europe	Japan	Aus-tralia	New Zealand	Average
				Percent				
Producer subsidy equivalent:								
Ruminant meat	11	10	40	50	66	4	8	29
Nonruminant meat	11	6	22	30	32	0	0	20
Dairy products	29	42	25	53	67	29	12	32
Wheat	59	40	59	52	91	15	0	55
Coarse grains	48	40	47	49	94	2	0	47
Rice	67	0	70	0	87	13	0	85
Oilseeds and products	7	13	28	0	20	0	0	14
Sugar	79	53	47	66	74	14	0	56
Other crops	33	-21	50	0	0	1	0	35
Average	26	27	33	47	66	12	10	35
Consumer subsidy equivalent:								
Ruminant meat	-1	-1	-20	-26	-33	0	0	-14
Nonruminant meat	-2	3	-15	-23	-19	0	0	-9
Dairy products	-15	-35	-14	-14	-42	0	0	-17
Wheat	-14	-15	-41	-45	-48	0	0	-36
Coarse grains	-12	-1	-42	-45	-15	0	0	-27
Rice	-4	0	-36	0	-72	0	0	-69
Oilseeds and products	0	0	1	0	0	0	0	0
Sugar	-47	-9	-28	-37	-29	0	0	-33
Other crops	0	7	0	0	0	0	0	0
Average	-8	-15	-17	-20	-35	0	0	-17

1/ Ruminant meat (beef, mutton, and lamb); nonruminant meat (pork, poultry meat, and eggs); dairy products (milk, butter, cheese, and powder); coarse grains (corn and other coarse grains); oilseeds and products (soybeans, soymeal, soyoil, other oilseeds, other oilmeals, and other oils); other crops (cotton and tobacco). Producer and consumer subsidy equivalent averages are weighted by base production and consumption values.

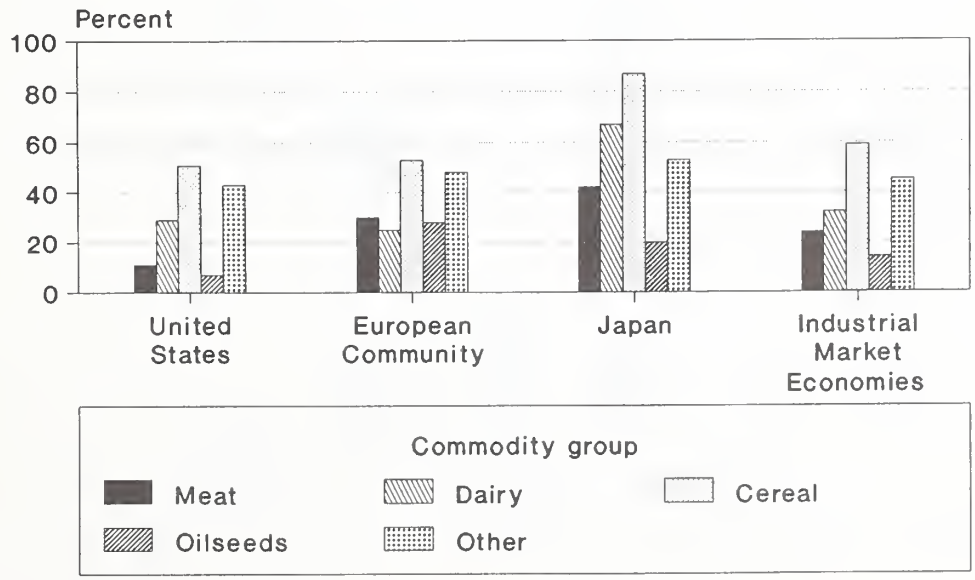
Sources: (USDA, 1988), (Roningen and Dixit, 1989).

Figure 1
Average producer and consumer subsidy equivalents, industrial market economies, 1986-87



Sources: USDA (1988) and Roningen and Dixit (1989).

Figure 2
Producer subsidy equivalents by commodity groups for the United States, the European Community, and Japan, 1986-87



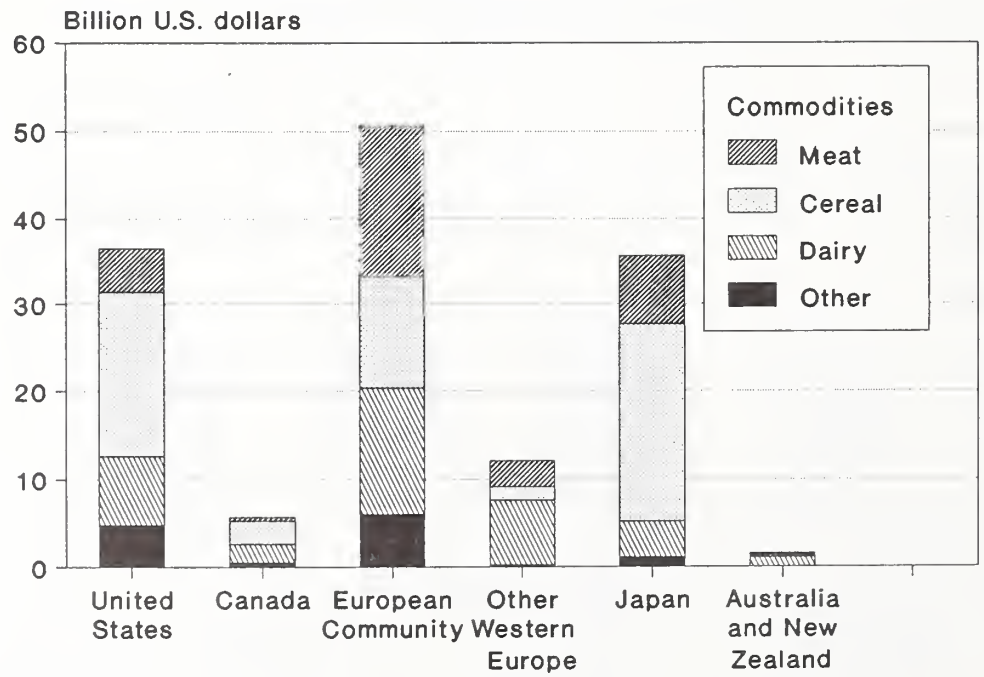
Sources: USDA (1988) and Roningen and Dixit (1989).

three regions were higher for cereal producers than for dairy producers. Cereal support rates were similar in the United States and the EC, but were much higher in Japan. Dairy support rates were higher than those for meats in the United States and Japan, but were lower in the EC.

Assistance to producers can also be compared across commodities within countries. Figure 3 shows the value of producer assistance in countries by broad commodity groups of meat, cereal, dairy, and other products. The share of assistance reflects both the size of the commodity sector in total commodity production and the level of assistance. In Canada, Australia, and New Zealand, the dairy industry receives a large part of total assistance, while in the United States, the grain industry accounts for the largest share of total government support. The share of producer assistance is distributed more evenly among the commodity groupings in the EC. Nearly two-thirds of the government assistance in Japan goes to wheat, rice, and coarse grain producers, even though the cereals sector accounts for only 40 percent of the total value of agricultural production.

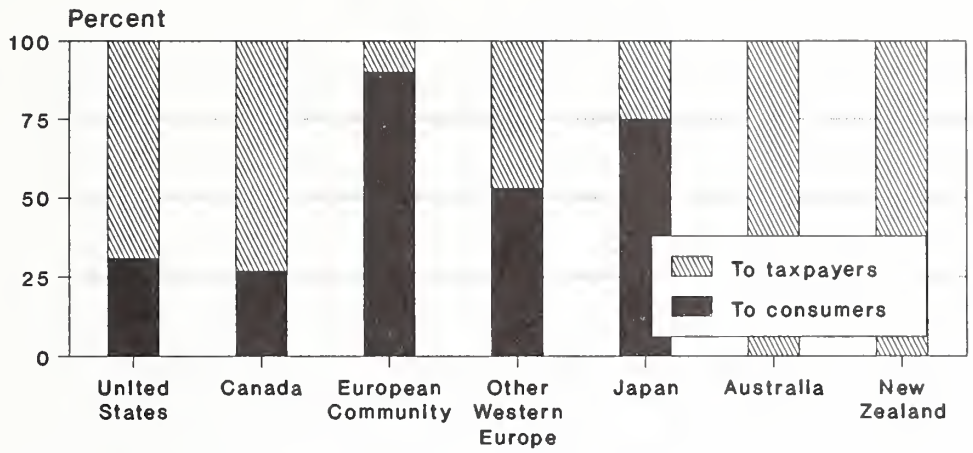
The costs of support must be borne either directly by domestic consumers through higher food prices or indirectly by taxpayers through increased government budgets. The distribution varies considerably among countries (fig. 4). In the EC and Japan, policies that artificially raise prices to (tax) consumers account for well over four-fifths of their support to agricultural commodities. Consequently, the CSE's are relatively high in those two

Figure 3
Value of producer support by commodity groups in industrial market economies, 1986-87



Sources: USDA (1988) and Roningen and Dixit (1989).

Figure 4
Distribution of cost of producer support, 1986-87



Sources: USDA (1988) and Roningen and Dixit (1989).

regions.[5] The United States, Canada, Australia, and New Zealand, however, maintain much less support through policies that transfer income from the consumer to the producer. Instead, these countries rely more on direct government budget support. The distortions in consumer prices, and hence the CSE's, are therefore much lower.[6]

The Model: Assumptions, Features, and Data Requirements

Analysis of the effect of agricultural support is done with the Static World Policy Simulation Modeling (SWOPSIM) framework (Roningen, 1986). A SWOPSIM model is characterized by three basic features: (1) it is a nonspatial price equilibrium model; (2) it is an intermediate-run static model that represents world agricultural markets for a given year; and (3) it is a multicommodity, multiregion partial equilibrium model. To use this static, nonspatial equi-

5/ In the industrial market economies, the CSE's are mostly negative and might have been described as a consumer tax equivalent because policies there often raise prices to consumers in a manner very similar to that of a sales tax. The balance of this report refers to some policies as taxing consumers in this sense.

6/ This difference in the source of producer support emphasizes how the structure of the support regimes in the EC and Japan differ from those of developed country exporters. Countries that are traditional importers have an easier support option: they can tax the consumer directly by import tariffs or quotas and thereby avoid government budget exposure. Exporting countries tend to use government budget expenditures for support, since export taxes would lessen their competitiveness on world markets. Distortions in trade typically would be larger with policies that tax consumers because such policies affect both consumption and production. Depending on how a country's policies operate, both levels of support and distribution of cost can vary with world market conditions.

librium model to describe world agricultural trade, we make the following assumptions:

- o world agricultural markets are competitive, in that countries operate as if they had no market power;
- o domestic and traded goods are perfect substitutes in consumption, and importers do not distinguish commodities by source of origin; and
- o a geographic region, though possibly containing many countries, is one marketplace.

SWOPSIM models are characterized by an economic structure that includes constant elasticity domestic supply and demand equations and summary policy measures (price wedges derived from PSE's and CSE's). Supply equations are functions of input or product prices, and if desired, other endogenous demand quantities (joint products). Demand equations are functions of own- and cross-product prices, and under certain circumstances, supply quantities of endogenous variables in the model. Trade is the difference between domestic supply and total demand (absorption) and, as such, does not permit separate identification of exports and imports in cases when a country exports and imports the same commodity.[7]

The policy structure is embedded in equations that link domestic and world prices. The standard policy structure is designed to allow flexibility in characterizing policies that may affect production, consumption, and trade. Policies are inserted as subsidy equivalents at the producer, consumer, export, or import level. In addition, price transmission elasticities characterize the degree of connection of domestic and world prices as world prices change. Exchange rates translate world trade prices to trade prices denominated in a country's domestic currency to link up with consumer and producer prices that are also denominated in the domestic currency. Details on the economic and policy structures inherent in the model can be found in Roningen (1986), Dixit and Roningen (1986), and Roningen (forthcoming).

The version of SWOPSIM (ST86) used in this report is designed to represent the 1986-87 (base marketing year) world temperate and subtropical zone agricultural markets in intermediate-run equilibrium. In a static model like ST86, all market participants (producers, consumers, and traders) are assumed to have faced the prices and policies that existed in the base period for about 5 years and to have adjusted to them. The observed quantities produced, consumed, and traded in 1986-87 are thus assumed to be in an equilibrium that follows adjustment to 5 years of unchanged prices and policies. This assumption about the adjustment period enters the model through the selection of values for the supply, demand, and price transmission elasticities.

Because ST86 is a synthetic model, we do not estimate elasticity parameters. Rather, we use parameters from other empirical studies to build the model.

7/ Stocks are not explicitly modeled in the SWOPSIM framework because markets are assumed to be in intermediate-run static equilibrium. Implicitly, though, stocks are presumed to be proportional to consumption flows. If shorter run adjustment problems and alternative policies for transition are important, then stocks would have to receive explicit treatment.

This procedure would typically imply a breach of theoretically valid behavioral relationships. We have attempted to overcome this limitation of synthetic models by imposing symmetry and homogeneity restrictions from demand theory to ensure consistency among own- and cross-price effects and restrictions based on multioutput production theory for modeling joint products (Haley, 1988). This procedure is similar to the application of theoretical constraints in computable general equilibrium models. However, we have closed only agricultural sectors of the economy, rather than the whole economy.

Twenty-two agricultural commodities, representing almost 90 percent of the total value of U.S. agricultural production, are included in the model: beef and mutton; pork and poultry; dairy, including manufacturing milk, butter, cheese, and other dairy products; wheat; corn and other coarse grains; rice; soybeans and soybean products, and other oilseeds and oilseed products; sugar; cotton; and tobacco. The model does not include tropical products, which account for a substantial portion of the agricultural trade of developing countries. The world is divided into 11 regions: 7 represent the industrial market economies, 3 characterize developing countries, and 1 describes the centrally planned economies. Region and commodity composition and the mnemonics used in presenting results are shown in table 2.

The model constructed for this exercise contains summary support measures for all regions except the centrally planned economies. However, commodity-specific price transmission elasticities that limit the passage of world price signals to their region constrain the interactions of the centrally planned economies' domestic sector with the world market. The centrally planned economies are assumed to have a price transmission of 0.2, indicating that only 20 percent of the changes in world prices are transmitted to the domestic economy. A price transmission elasticity of 0.5 is used for developing countries when the industrial market economies liberalize their own policies.[8] For industrial countries, a price transmission of 1 is used. This implies that any multilateral removal of support would also remove any insulation of domestic markets from world price movements.

Six types of data for each commodity in each country were required to construct ST86: supply, demand, and trade data for 1986-87; own- and cross-price elasticities of demand and supply; price transmission elasticities; technical coefficients, such as feed conversion ratios; PSE and CSE data; and macroeconomic data, such as exchange rates.

Supply, demand, and trade data were obtained from the U.S. Department of Agriculture's Foreign Agricultural Service, while exchange rate information was acquired from the International Monetary Fund's International Financial Statistics. The own- and cross-price elasticity estimates for demand and supply were based on a number of empirical studies. Details on the estimates and the technical coefficients used in the model are presented in Gardiner, Liu, and Roningen (1989), while this report later details the appropriateness of the selection of elasticities. Information on price transmission can be

8/ Very little published information exists concerning price transmission elasticities for centrally planned economies and developing countries. The estimates we use are our best judgments based on studies presented in Carter and Gardiner (1988).

Table 2--Commodity and country coverage in ST86

Product aggregates	Detailed product coverage and mnemonic 2-letter codes
Ruminant meat	Beef and veal (BF), mutton and lamb (ML)
Nonruminant meat	Pork (PK), poultry meat (PM), eggs (PE)
Dairy	Milk (DM), butter (DB), cheese (DC), milk powder (DP)
Dairy products	Butter (DB), cheese (DC), milk powder (DP)
Wheat	Wheat (WH)
Coarse grains	Corn (CN), other coarse grains (CG)
Rice	Rice (RI)
Oilseeds and products	Soybeans (SB), soymeal (SM), soyoil (SO), other oilseeds (OS), other meals (OM), other oils (OO)
Sugar	Sugar (SU)
Other crops	Cotton (CT), tobacco (TB)
Farm products	Beef (BF), pork (PK), mutton and lamb (ML), poultry meat (PM), eggs (PE), milk (DM), wheat (WH), corn (CN), other coarse grains (CG), soybeans (SB), other oilseeds (OS), cotton (CT), sugar (SU), tobacco (TB)

Country or region	Database country coverage and TLIB mnemonic 2-letter codes 1/
United States	United States (US)
Canada	Canada (CN)
EC	European Community-10 (EC-10), Spain (SP), Portugal (PT)
Other Western Europe	Other Western Europe (WE)
Japan	Japan (JP)
Australia	Australia (AU)
New Zealand	New Zealand (NZ)
Developing exporters	Brazil (BZ), Argentina (AR), Indonesia (DO), Thailand (TH), Malaysia (ML), Philippines (PH)
New industrialized Asia	South Korea (SK), Taiwan (TW), Other East Asia (EA)
Centrally planned economies	Eastern Europe (EE), Soviet Union (SV), China (CH)
Developing importers	South Africa (SF), Mexico (MX), Central America and Caribbean (CA), Venezuela (VE), Other Latin America (LA), Nigeria (NG), Other Subsaharan Africa (AF), Egypt (EG), Middle East and North Africa, oil producers (MP) Middle East and North Africa, non-oil producers (MO) India (ND), Other South Asia (OS), Other Southeast Asia (SA), Other Asia (OA), rest-of-world balancing world trade (RW)

1/ TLIB is a 22-commodity, 36-country or -region database for 1984 and 1986, containing production, consumption, trade, price, and support data. Data from the TLIB database were aggregated according to the above regional groupings to form the ST86 model used for this report. Although the full TLIB database has been used as a large model, turnaround time for model runs is much less if the model is aggregated to a regional level adequate to explore the research problem at hand.

Sources: Details on the TLIB database can be found in Sullivan, Wainio, and Roningen (1989). Information on aggregation and other model procedures and updates can be found in Roningen (a forthcoming staff report further documenting the SWOPSIM model).

found in Sullivan and Liu (forthcoming), while data on PSE's and CSE's are given in USDA (1988).

Since PSE's reported in USDA (1988) do not incorporate costs of required supply control associated with farm programs, such as acreage reduction programs in the United States and the paddy-field reorientation program in Japan, these PSE's, in effect, exclude some of the production-offsetting elements of policies. Such policies, therefore, are incorporated directly as volume shifters when modeling the sector. Additional information on supply management programs and their treatment in the modeling framework can be found in Roningen and Dixit (1989) and Herlihy, Johnston, and Haley (forthcoming).

This report presents the results of experiments using the ST86 model in which new equilibrium solutions are obtained by removing PSE's and CSE's. The new solutions represent an approximation of the resulting adjustments in production, consumption, trade, and prices of agricultural commodities expected after 5 years, with the important proviso that all other conditions remain the same as in the base year, 1986-87. This permits the analysis to isolate and identify the differences between the new solution and the initial or reference solution and to attribute them to the removal of distortionary agricultural policies.

The Model: Validation and Properties

The reference solution in ST86 replicates the actual prices and quantities produced, consumed, and traded in the base year. This replication is not, however, evidence of a valid model. Rather, it describes only our system of initializing the model. A practical check of validity is to examine whether certain model properties appear reasonable.[9]

One such property of considerable interest is a measure of producer and consumer response to price changes. Table 3 presents aggregate supply and demand elasticities that reflect the variation of own- and cross-price elasticities for all regions in the model. The parameters generally suggest that agricultural output in most industrial market economies does not respond greatly to changes in agricultural prices over the medium term. The aggregate supply elasticities range between 0.35 and 0.5 for industrial countries, and reflect the possibility of resources shifting slightly among several alternative outputs. This is consistent with constraints on inputs, such as land, that would limit the aggregate response of farm sectors to price changes expected from trade reform. Among developing countries, the aggregate supply elasticities vary little, ranging from a low of 0.27 for the rest of the world importers to 0.33 for the newly industrialized economies of Asia that practice intensive agriculture. Aggregate demand elasticities are inelastic for both industrial and developing countries. Several other models, including those used in OECD (1987) and Parikh, Fischer, Frohberg, and Gulbrandsen (1988), obtain similar aggregate elasticities.

9/ No acceptable validation procedure exists for synthetic models. Validation, in our context, refers more to the reasonableness of certain parameter estimates implied by the model.

Table 3--Aggregate supply and demand elasticities in ST86

Country or region	Supply	Demand
United States	0.37	-0.37
Canada	.35	-.39
EC	.37	-.30
Other Western Europe	.40	-.29
Japan	.50	-.37
Australia	.42	-.35
New Zealand	.40	-.13
Developing exporters	.30	-.36
Centrally planned economies	.22	-.20
New industrialized Asia	.33	-.37
Developing importers	.27	-.36

Source: Calculated by weighting product supply and demand elasticities by production and consumption.

Partial net trade elasticities also provide some indication of the validity of the model. Table 4 gives the own-price partial net trade elasticities that the United States faced over the medium term. These partial elasticities were derived by exogenously increasing by 10 percent the world price for the particular commodity in the reference solution, while holding all other prices fixed. We focused on the United States largely because of the availability of such information for comparative purposes.

The net trade elasticities for U.S. grain exports are -1.9 for corn, -4.2 for wheat, and -19.1 for rice. The wheat and corn estimates fall within the longrun bounds provided by Gardiner and Dixit (1987). The large estimates for rice reflect the small share of U.S. exports in world rice trade.[10]

The medium-term elasticity of export demand for U.S. soybeans is -1. This compares favorably to the Gardiner and Dixit longrun mean of -1.3. The elasticity estimates for most animal products are large, especially for nonruminant meat. These estimates again reflect the small share of world animal products trade accounted for by the United States.

Comparing U.S. net trade elasticities may provide some indications of the validity of the model, but it certainly is not foolproof. First, we were unable to find empirical estimates of net trade elasticities for a number of commodities, including animal products, sugar, and tobacco. Moreover, even for those commodities with available estimates, there was little consensus

10/ The estimates in table 4 are based on a price transmission elasticity of 1 for industrial market economies, but 0.5 and 0.2 for developing countries and centrally planned economies. This suggests that the elasticity estimates are probably larger than those that exist with current policies in place, but are much smaller than those that would exist under a free trade environment.

Table 4--Own-price net trade partial elasticities implied by ST86 for U.S. agricultural products

Commodity group	Own-price change	All price changes
Ruminant meat 1/	16.3	12.6
Nonruminant meat	44.6	29.6
Dairy products	-52.0	-37.3
Wheat	-4.2	-2.0
Coarse grains	-1.9	-.4
Rice	-19.1	-16.4
Oilseeds and products	-1.0	-.3
Sugar	10.3	8.7
Other crops	-2.2	-1.8

1/ Elasticities reported are for the most important commodity within the commodity group: Ruminant meat (beef), nonruminant meat (pork), dairy products (butter), coarse grains (corn), and other crops (cotton).

Source: Calculated from SWOPSIM ST86 simulations.

in the literature on the size of the parameters. Lastly, even though the U.S. estimates may appear reasonable, they do not necessarily ensure that we adequately modeled the responses of other countries, especially for markets in which the United States does not play a major international role.

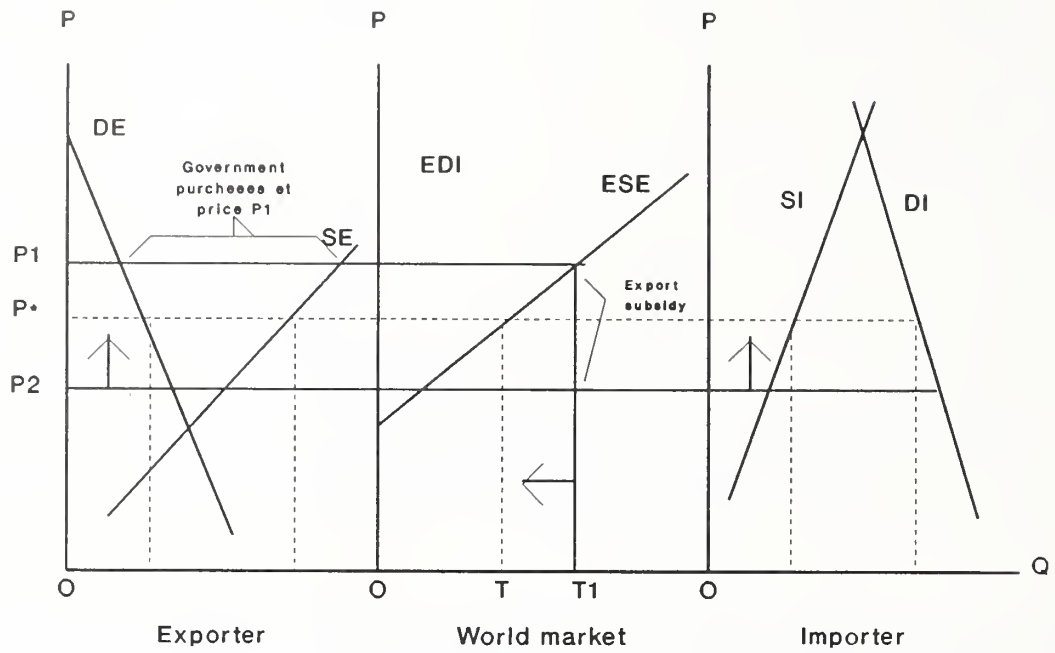
Market Effects of Removing Assistance to Agriculture in Industrial Market Economies

To understand the theoretical market effects of eliminating assistance to agriculture in developed countries, consider figure 5, which assumes a one-exporter, one-importer, one-commodity partial equilibrium world market. If there were no interventions in the markets, the equilibrium world price would be P*. At price P*, the excess supply in the exporting country would equal excess demand in the importing country, and quantity OT would be traded.

Consider the case where the exporting country intervenes in its domestic markets and raises the domestic price to P1. At P1, the exporting country would be producing more but consuming less, increasing its excess supply. If the exporting country stockpiled this surplus, as the United States has done over the years, the world price could be maintained at P1. But over any length of time, the surpluses cannot be stored except at prohibitive costs. Under such circumstances, the exporting country may pursue a policy to dump the surpluses in the world market through the use of export subsidies, as is done by the EC. World prices would then fall to P2, and the level of assistance to producers in developed countries, as measured by PSE's, would be the difference between domestic and world price (P1-P2). World trade would expand to OT1 because of the use of export subsidies.

In the current market environment, exporting countries are intervening with a high domestic price, lowering the world price to P2. If these countries eliminated their support to agriculture, the removal of assistance (PSE's)

Figure 5
Market effects of liberalizing trade in exporting countries

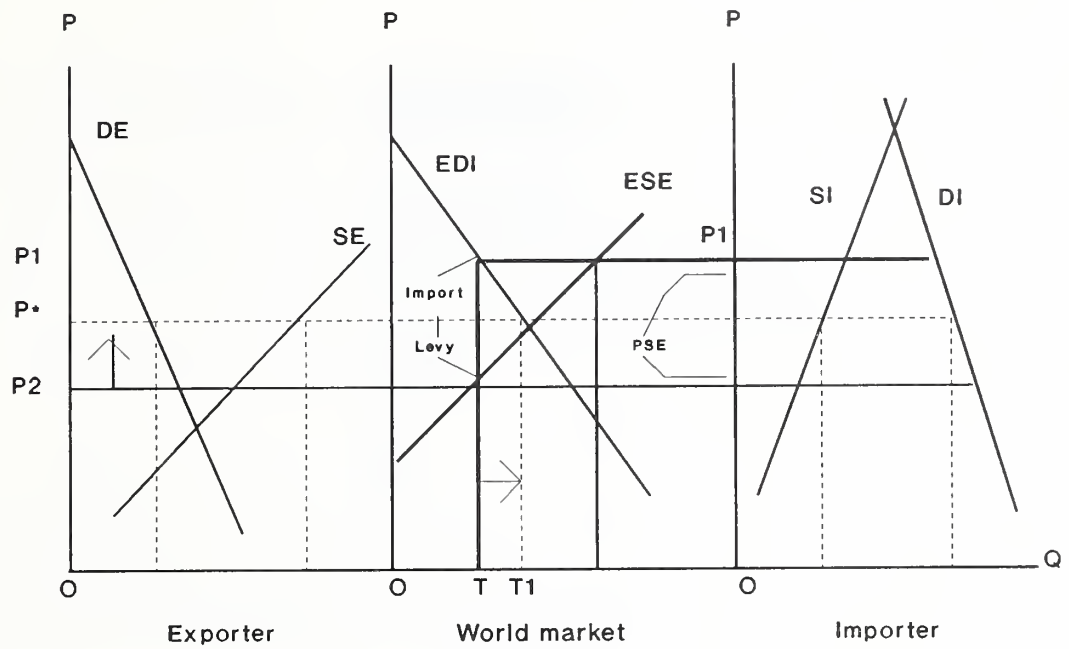


would lower internal prices, curtailing domestic production and increasing consumption. Aggregate demand would then exceed aggregate supply in the world market, and the world price would rise to achieve equilibrium. World trade would fall to OT, and the world price would increase to P*. The magnitude of the increase in world price (P*-P2) would be closely related to the level of support (P1-P2): the higher the level of support, the greater the increase in world price.

We just illustrated that in a one-commodity case with a subsidizing exporter, trade liberalization by the exporting country would increase world prices and contract world trade. This, however, need not be the case. If importing countries distort world trade through the use of trade barriers, as has been the case with Japanese beef imports, removal of protection could expand world trade and increase prices (fig. 6). The initial market environment is one where the importing country imposes import restrictions and limits world trade to OT at a world market price of P2. If the importing country subsequently removed its import levy, imports would increase and world trade would expand to OT1. World price, as before, would increase to P*.

Exporting and importing countries use a variety of measures that distort trade, with some expanding trade and others limiting trade. A priori, therefore, it is difficult to hypothesize the domestic and international effects of trade liberalization. Our study is designed to identify the market implications of agricultural policies pursued by a number of industrialized market

Figure 6
Market effects of liberalizing trade in importing countries



economies. We focus on two issues: the global market effects of multilateral trade liberalization by industrial market economies, and the contribution of each country's policies to current market conditions.

Keep two points in mind in interpreting the model results. First, our findings are based on a static model that assumes that the new solution represents an equilibrium after about 5 years of adjustment, with all other conditions remaining the same. Our static results do not account for changes that may occur in a dynamic world economy, even without the removal of government assistance. Hence, the results can only approximate the magnitude of changes that might be expected if only the factors varied in the model were operative. In reality, however, additional factors not covered in the model would also be varying over time, and would have additional important influence on the outcome. Increases or decreases implied by the model could, when translated into a real-world environment, represent only expanded or reduced growth and not increases or decreases in absolute magnitudes. For instance, a production decline obtained from the model could be interpreted as a decline in the rate of increase in production that might occur because of secular growth trends.

Second, to identify a country's contribution to world market changes, agricultural assistance in each country is unilaterally eliminated, keeping the price transmission elasticity for all other industrial market economies at 1. This may not represent a realistic unilateral liberalization, because a price transmission elasticity of 1 implies that other industrial market economies do not insulate their domestic sectors from changes in the world market price but maintain their specific ($/metric ton) protection rates. However, to the extent that increases in world prices are considered desirable by governments in most industrial market economies, it seems reasonable to assume that govern-

ments in these countries would allow the world price effects to be transmitted to their domestic economies.

Effects on World Prices

Liberalizing agricultural policies in all industrial economies would, on average, increase world agricultural prices by 22 percent (table 5). The rise in world prices would be greatest for dairy products (65 percent), followed by sugar prices (53 percent). These large price increases would occur because levels of assistance to both dairy products and sugar in industrial market economies are relatively high, and industrial market economy trade is a major part of world trade. World prices for wheat (37 percent), rice (26 percent), coarse grains (26 percent), and ruminant meat (21 percent) would also increase noticeably for the same reasons. By contrast, world prices for oilseeds and products (6 percent) would increase only slightly, indicating that agricultural policies pursued by industrial market economies have only modestly depressed prices for those commodities.

How meaningful is the roughly 20-percent increase in world prices that follows multilateral liberalization in terms of price behavior on world agricultural markets? The price change is equal to the average deviation in world prices in any particular year as a percentage of average prices over the past 20 years (fig. 7). It is much less than the average extreme deviation in world

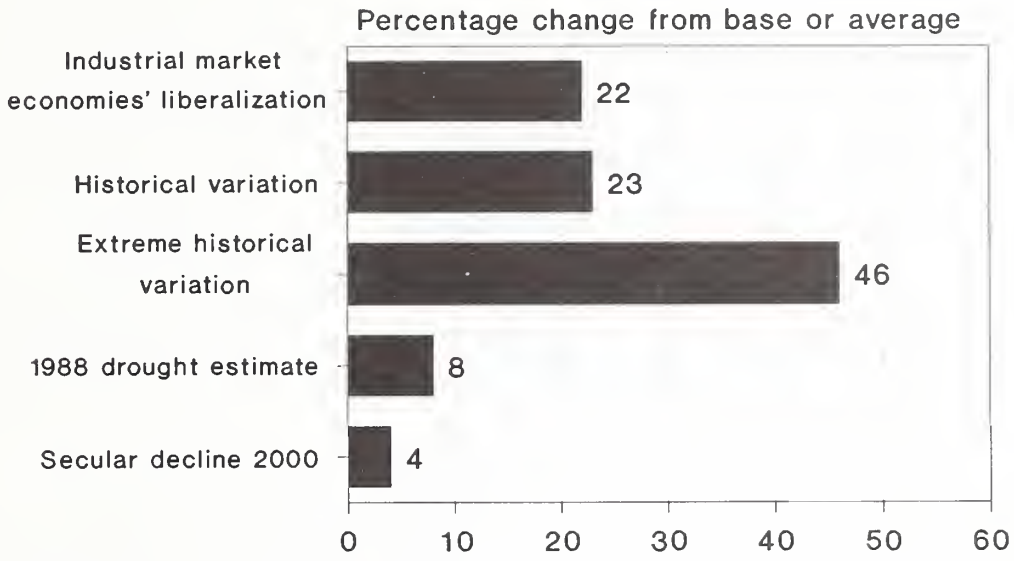
Table 5-- World price effects of liberalization, 1986-87

Commodity group	Unilateral liberalization 1/							Multilateral liberalization by industrial market economies
	United States	Canada	EC	Other Western Europe	Japan	Australia	New Zealand	
	Percent							
Ruminant meat	3.8	0.4	13.5	1.5	1.8	0.2	0.2	21.0
Nonruminant meat	3.0	.5	5.8	1.0	2.3	.1	0	12.4
Dairy products	23.5	4.1	31.6	6.2	4.5	.7	.5	65.3
Wheat	10.6	4.1	19.1	1.6	2.5	1.6	0	36.7
Coarse grains	11.6	2.2	11.5	1.5	.6	.2	0	26.3
Rice	2.9	.4	3.2	.2	19.6	.2	0	26.2
Oilseeds and products	-2.6	.5	7.9	.2	.4	0	0	6.4
Sugar	22.8	.4	18.6	3.3	6.4	1.1	0	52.7
Other crops	4.0	0	3.3	.1	.7	-.1	0	7.7
Aggregate	5.9	1.2	10.6	1.4	3.6	.3	.1	22.0

1/ Unilateral liberalization means that each country removed its support while others maintained theirs. Multilateral liberalization means that all industrial market economies simultaneously removed their agricultural support.

Source: SWOPSIM ST86 simulations.

Figure 7
World price effects of industrial market economies' liberalization in perspective



Sources: SWOPSIM ST86 simulations; Roningen, Dixit, and Seeley (1988); and ERS and World Bank data.

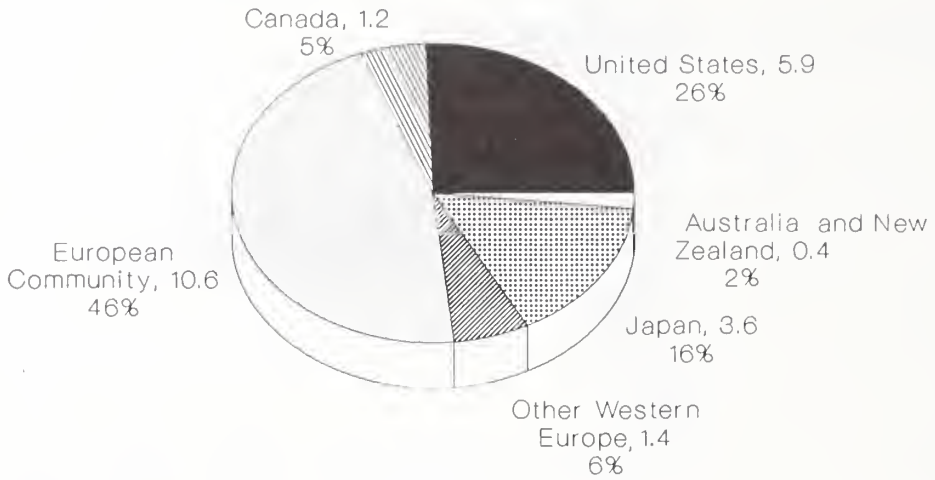
prices that occurred in the mid-1970's, but more than double the price effects of the 1988 drought. Furthermore, it overwhelms a secular decline in real prices that could occur up to the year 2000 if historical long-term trends continue.[11]

Thus, in historical terms, the magnitudes are significant but not overwhelming. Historical experience with price changes, it would appear, is relevant to both the analysis of trade liberalization and the real-world adjustment problems that might arise from that liberalization.

Our results also show that the EC and the United States contribute the most to the world price changes. Unilateral liberalization of EC agricultural policies would raise world agricultural prices an average of 11 percent (fig. 8). This is nearly half of the increase that would result if all industrial market economies simultaneously eliminated their support to agriculture. The price effects of EC policies are most visible in dairy product, sugar,

11/ Variation in world prices is measured as a weighted average of coefficients of variation of ST86 reference prices from 1960-61 to 1984-85. The average extreme deviation is the weighted average of half the difference between minimum and maximum prices adjusted to the mean of the respective commodity prices for the entire period. The 1988 drought estimates are ST86 price effects implied by U.S. and Canadian crop shortfalls (Washington Post, 1988). The 4-percent secular decline is the result of an ST86 projection to the year 2000 and represents an ST86 interpretation of downward long-term real price trends (Roningen, Dixit, and Seeley, 1988).

Figure 8
Contribution to world price changes, 1986-87



Source: SWOPSIM ST86 simulations.

ruminant meat, and wheat markets. Our results indicate that if the EC unilaterally removed all assistance to agriculture, world prices for dairy products and wheat would rise by 32 and 19 percent. EC policies also appear to influence world coarse grain prices. Elimination of assistance to agriculture, mainly export refunds to barley and variable levies on corn imports, would raise world coarse grain prices by 12 percent.

Unilateral elimination of U.S. agricultural support policies would raise world sugar and coarse grain prices by 23 and 12 percent, equivalent to nearly half the increases in world prices from multilateral liberalization. These increases in world prices are consistent with our earlier observation that the sugar and grain sectors were the two most heavily supported sectors in the United States during 1986-87. Our results also indicate that U.S. policies are partly responsible for depressed world prices for wheat. Nearly a third of the increase in world wheat prices from multilateral liberalization could be achieved if the U.S. unilaterally liberalized its policies. By contrast, even though support to rice producers is highest among U.S. grains support, unilateral U.S. liberalization would have very little effect on the world rice price (3 percent) because U.S. shares of world rice production and consumption are very small (1 percent).

Despite similar rates of producer support, U.S. policies have had far less price-depressing effects in world grain markets than have EC policies. One reason for this is that U.S. consumer prices are not very distorted. Consequently, removal of support does not lead to increased quantity demanded. Another reason is that the distortionary implications of U.S. grain policies are moderated somewhat by set-aside programs, which have restricted acreage expansion that would have occurred with high domestic producer prices.

The success of these supply management programs, however, depends to a large extent on the effects on production from land set aside. Agricultural economics literature (Tweeten, 1979) seems to suggest that U.S. acreage set-aside programs have been only partially successful in controlling supply because of production slippage. Production slippage would occur either if government supply management programs were to draw more land into production than would otherwise be cultivated or if farmers were to increase their yield on cropped land in response to supply management programs. For this study, we assumed--based on empirical econometric estimates--that because of set-aside requirements, average yields on cropped lands were 2-10 percent higher, and that 3 of 4 acres set aside come back into production (Roningen and Dixit, 1989). In a separate experiment, however, we assumed that U.S. set-aside policies were completely effective and that no slippage occurred. Under those circumstances, we found that U.S. unilateral liberalization would increase world prices of wheat, coarse grains, and rice by 4, 4, and 1 percent, compared with the 11, 12, and 3 percent with slippage. U.S. set-aside programs would be almost trade neutral if production slippage did not occur.

Even though assistance to agriculture is high in Japan and Other Western Europe, policies in these countries do not have very much influence on international prices because these countries are not major participants in the world agricultural market. Japan in the rice market is the only exception. Japan's policies affect world rice prices more than the combined effects of all other developed countries' policies. Policies of Canada, Australia, and New Zealand do not affect international prices very much because of their small size in world markets.

Effects on World Trade

One would expect liberalization to increase specialization by countries because of their comparative advantage and to increase trade. Indeed, model results indicate that world agricultural trade volumes for most commodities would expand when industrial market economies simultaneously liberalize (table 6). The expansion is substantial for rice and sugar trade. Much of the expansion in sugar and rice trade results from liberalization by the United States and Japan, respectively. The elimination of production incentives leads to lower production and expanded imports for each commodity. Quantity traded of other agricultural commodities would also expand. World trade in oilseeds and oilseed products would increase by 14 percent, and that for ruminant meat by 10 percent. Even though the proportionate increases in non-ruminant meat and dairy trade are large, in absolute volume terms, these changes are rather small.

World wheat trade volumes would deflate (20 percent) with multilateral liberalization. The increase in world price is not enough to compensate producers in industrial countries for the loss in government assistance, thereby leading to lower production and reduced exportable surpluses. This occurs despite the impetus for increases in U.S. wheat production that results from the release of land set aside under government programs. Trade in coarse grains would also decline, but by much less (5 percent).

Traditional food exporters, such as Australia and New Zealand, would not only expand their exports of grains but would also increase exports of high-valued products like meat and dairy products. The United States, in contrast, would

Table 6--Trade balance changes from multilateral industrial market economies' liberalization, 1986-87

Commodity group	United States	Canada	EC	Other Western Europe	Japan	Aus-tralia	New Zealand	Devel-oping export-ers	Cen-trally planned econ-omies	New indus-trial Asia	Devel-oping import-ers
					Million metric tons						
Trade volume:											
Ruminant meat	1.1	0.1	-1.9	-0.2	-0.4	0.2	0.1	0.4	0.1	0	0.5
Nonruminant meat	.4	.1	-.9	-.3	-.5	.1	0	.2	.5	.1	.3
Dairy products	-.4	-.1	-.3	-.2	-.2	.1	.2	.1	.3	0	.4
Wheat	-3.0	-.8	-12.9	-.7	-.8	1.6	.1	1.1	4.6	.2	10.6
Coarse grains	-8.3	-3.2	-5.0	-1.0	3.9	.4	.1	3.0	1.9	.2	8.1
Rice	-.4	0	-.6	0	-8.9	0	.1	2.0	1.0	.1	6.8
Oilseeds and products	1.7	.1	-1.7	.3	.5	0	0	-.6	-.1	-.1	-.1
Sugar	-3.4	0	-1.5	-.4	-.8	.5	0	1.8	.4	.1	3.1
Other crops	-.2	0	0	0	0	0	0	0	0	0	.1
					Billion dollars						
Trade value: 1/											
Ruminant meat	2.5	.2	-4.8	-.5	-1.1	1.1	.8	1.0	.3	0	.6
Nonruminant meat	1.0	.1	-1.1	-.6	-1.9	.2	0	.4	1.5	.1	.4
Dairy products	-1.2	-.3	.1	-.3	-.8	.6	1.6	.1	1.0	0	-.9
Wheat	.7	.7	-1.4	-.1	-.4	.9	0	.1	-.4	-.2	0
Coarse grains	.3	-.2	-.6	-.1	-.1	.1	0	.5	0	-.2	.3
Rice	0	0	-.2	0	-2.4	0	0	.8	.3	0	1.4
Oilseeds and products	.4	.2	-.7	.1	0	0	0	.3	.1	0	-.2
Sugar	-.8	0	-.3	-.1	-.2	.3	0	.7	-.3	0	.8
Other crops	-.1	0	-.3	0	-.1	0	0	0	.1	-.1	.4
Total	2.8	.7	-9.1	-1.8	-7.0	3.2	2.4	3.9	2.5	-.5	2.8
					Percentage change						
Export share:											
Wheat	1.0	2.4	-10.8	-.3	N/A	4.6	N/A	1.3	.9	N/A	.9
Coarse grains	-7.2	-3.8	5.4	-.4	N/A	.6	.1	3.3	.8	N/A	1.3
Rice	-7.6	N/A	-2.5	N/A	N/A	-.6	N/A	3.9	1.7	-.2	5.2

- = Decreases in net trade (exports minus imports).

N/A = Not applicable.

1/ The signs for trade value changes may differ from signs of trade volume changes because price changes may more than compensate for quantity trade balance changes.

Source: SWOPSIM ST86 multilateral trade liberalization simulation.

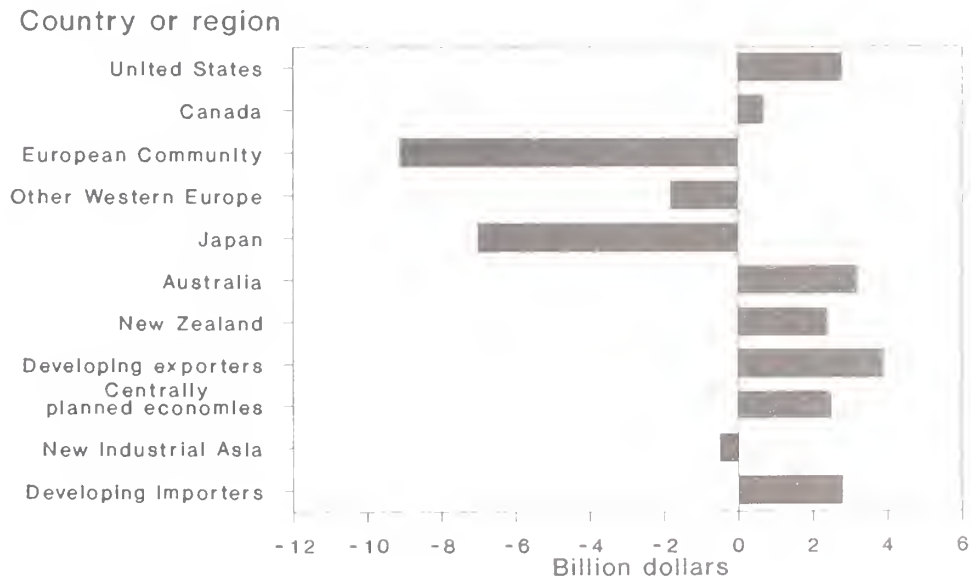
reduce grain exports but increase meat exports. The EC would switch from an exporter of ruminant meat to one of the largest importers, and the same would be true in Japan for rice. In the sugar market, the United States would more than double its imports of sugar from developing markets, while the EC would curtail its sugar exports and be barely self-sufficient in sugar.

The value of net trade also changes substantially with liberalization (fig. 9 and table 6). The United States would improve its agricultural trade balance by $3 billion, or nearly 25 percent. Most of this improvement would result from decreases in beef import costs and increases in grain export revenues because of rising world prices.

Australia and New Zealand would each improve their agricultural trade balance by nearly $3 billion, or more than two-thirds of their 1986-87 agricultural trade earnings, while the EC and Japanese trade balances would worsen by $9 billion and $7 billion. Industrial market economies' net export earnings would decline by $9 billion, while developing countries would reduce their aggregate net import costs by $6 billion. Global trade value would increase by $18 billion with multilateral liberalization.

Much of the source of trade conflict among developed countries in the last few years has been the issue of export market shares. The EC proposal for the Uruguay Round of the GATT, for instance, advocates managing exports of commodities in surplus. This is tantamount to fixing grain market shares. Table 6 shows the changes following multilateral liberalization in export market

Figure 9
Change in agricultural trade balance with industrial market economies' liberalization, 1986-87



Source. SWOPSIM ST86 simulations.

shares for wheat, rice, and coarse grains. EC export shares in wheat trade would fall greatly with multilateral liberalization. U.S. export shares in the coarse grain and rice markets would fall moderately, while rising moderately in the wheat market. The major export-share gainers would be Australia and some of the developing exporters.

Our results on world price and trade changes point to three basic implications. First, if industrial market economies simultaneously liberalized their policies, world prices and trade for most commodities would increase. Second, the price increases would be greater than if individual countries liberalized unilaterally. The total effect on world prices from a multilateral removal of support is roughly the sum of all unilateral effects. Finally, some changes would occur in market shares among most major grain exporters.

Effects on Domestic Prices and Production

The multilateral elimination of support to agriculture in industrial market economies would lower overall producer prices for most commodities in many industrial countries (table 7).[12] Japanese producer prices would decline the most (49 percent), followed by producer prices in the EC (20 percent). As indicated earlier, both Japan and the EC have high levels of protection for domestic producers. The overall decline in U.S. producer prices (13 percent) would be much more moderate because of increased prices for livestock producers. Producers in Australia and New Zealand would experience higher prices (14 and 16 percent) because increases in world prices would more than compensate for declines in government assistance.

In the case of the United States, however, prices received by producers at the farmgate level (excluding direct payments), would rise 13 percent because of increases in world trade prices. Consequently, despite the loss of government assistance, cash receipts of U.S. producers from the market would increase by $2.6 billion following multilateral liberalization. By contrast, both farmgate prices and cash receipts from marketing would decline for EC and Japanese producers.

Production of most agricultural commodities in industrial market economies would fall with multilateral liberalization because of declines in domestic producer prices. Total farm output in the United States would fall 1 percent, while in the EC and Japan, it would decline 7 and 32 percent. Farm output in Australia and New Zealand would increase in response to higher producer prices, as would output in all developing countries.

For industrial market economies as a whole, the largest output declines under multilateral liberalization would be for rice, sugar, and wheat. While Japan would account for nearly the entire fall in rice production, the United States would account for much of the output decreases in sugar. More than two-thirds of the decline in wheat production would occur in the EC. Global supply would

12/ Producer prices in the context of our model refer to the incentive price received by producers. Incentive prices include the full value of the producer subsidy equivalent. Farmgate prices exclude direct payments to producers (See Roningen and Dixit (1989) for additional information).

Table 7--Producer price and output changes from multilateral industrial market economies' liberalization

Commodity group	United States	Canada	EC	Other Western Europe	Japan	Aus-tralia	New Zealand	Devel-oping export-ers	Cen-trally planned econ-omies	New indus-trial Asia	Devel-oping import-ers
					Percent						
Producer price: 1/											
Ruminant meat	7	8	-27	-41	-59	18	16	11	2	5	11
Nonruminant meat	2	5	-13	-22	-24	13	15	6	2	6	5
Dairy products	-15	-27	-2	-51	-56	51	71	22	8	0	27
Wheat	-44	-18	-44	-35	-87	17	37	11	8	8	21
Coarse grains	-33	-26	-34	-37	-92	19	24	10	4	3	10
Rice	-59	26	-62	26	-83	9	0	10	5	3	13
Oilseeds and products	-7	-4	-24	7	-19	8	5	2	1	0	5
Sugar	-69	-29	-20	-48	-60	31	53	17	5	11	19
Other crops	-27	26	-42	5	4	9	4	3	1	2	4
All farm products	-13	-6	-20	-24	-49	14	16	8	3	4	9
Production output: 2/											
Ruminant meat	4	3	-15	-24	-13	8	11	5	0	1	4
Nonruminant meat	0	-2	0	-9	-15	7	8	3	0	2	2
Dairy products	-5	-4	0	-17	-18	8	15	6	2	0	4
Wheat	-6	-3	-16	-13	-61	10	23	4	1	2	6
Coarse grains	-4	-15	-4	-10	-71	5	11	4	0	0	3
Rice	-11	2	-32	5	-48	3	0	3	0	0	4
Oilseeds and products	2	1	-16	0	-16	0	-1	0	0	0	-1
Sugar	-42	-10	-3	-26	-34	14	9	8	0	2	5
Other crops	-7	5	-11	0	0	-1	0	0	0	0	0
All farm output	-1	-2	-7	-13	-32	7	10	3	0	1	2
Agricultural gross domestic product 3/	16	18	16	5	-6	35	47	21	20	17	25

1/ Producer incentive prices, including direct support payments.

2/ Value-weighted quantity index.

3/ Value of farm production excluding support.

Source: SWOPSIM ST86 multilateral liberalization simulation.

remain largely the same for all commodities despite multilateral liberalization. Increases in world prices would modestly stimulate production in developing countries and would compensate for output changes in industrial market economies.

Despite the decline in production in most industrial countries, the net value added by agriculture would increase in those economies because of rising world

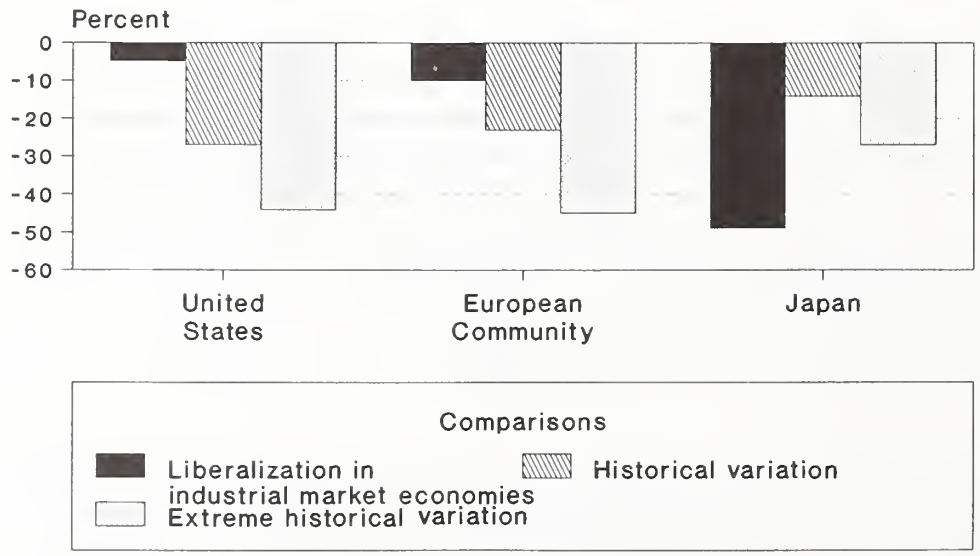
prices. The increases in nominal agricultural gross domestic product would be between 15 and 20 percent for the United States, Canada, and the EC, but much larger for Australia and New Zealand. Japanese agricultural gross domestic product would actually fall by 6 percent because of large declines in production. We might also add that agricultural gross domestic product would decline in all industrial countries if they unilaterally liberalized their policies.

Finally, how do the magnitudes of estimated production changes compare with historical experience? As was the case with world price movements, we compared the estimated change in cereal production for the United States, the EC, and Japan with other indicators of change (fig. 10). The country comparisons provide very different perspectives. While the production decreases in the United States are much lower than the expected average annual deviation, exactly the opposite is true for Japan. In the EC, in contrast, the declines in production following multilateral liberalization are about the same as the annual average expected deviation. Farmers in the United States and the EC would be better suited to cope with production changes following liberalization than would farmers in Japan.

Effects on Economic Welfare

Agricultural support policies in industrial market economies have reduced national income by encouraging inefficient use of resources. They have also transferred incomes from the nonfarm to the farm sector and from consumers and taxpayers to agricultural producers. To better understand the economic

Figure 10
Declines in cereal production versus historical experience



Sources: SWOPSIM ST86 multilateral liberalization simulation and USDA historical production data.

welfare implications of agricultural trade liberalization, we pose two questions: (1) What are the distortionary costs associated with the agricultural policies of each industrial market economy?; and (2) What are the potential gains that can be generated if all industrial market economies simultaneously liberalized their agricultural policies?

Table 8 summarizes our estimates of the annual costs to consumers and taxpayers, the benefits to producers, and the efficiency losses (welfare costs) from distortionary policies pursued in 1986-87. Our results indicate that the costs to consumers and taxpayers of distortionary policies in individual industrial market economies are considerably more than the benefits to producers. For every dollar that producers in industrial market economies gain because of protectionist policies, consumers and taxpayers lose $1.42. Consumers and taxpayers in the United States forfeit $1.38 in transfers for every dollar gained by producers. The transfer costs are higher for the EC ($1.45) and Japan ($1.48).

Our study shows that only about 70 percent of the costs to consumers and taxpayers in industrial market economies are transferred to producers. The other 30 percent represents income losses to society arising from misallocated resources. The income losses are greatest for the EC ($15 billion), followed by the United States and Japan ($9 billion each). Because Japan has a much smaller population than either the United States or the EC, the annual per capita costs to Japan ($71) are much bigger than those for the United States ($38) or the EC ($46).

Table 8--The annual benefits of agricultural support to producers and costs to consumers and taxpayers in industrial market economies, 1986-87 1/

Country or region	Producer benefits	Consumer costs	Tax-payer costs	Net economic costs		Transfer benefits to producers			
				Total 2/	Per capita	Per nonfarm household	Per dollar lost by producers	Producer share of transfers	Ratio of transfers to income loss
	Billion dollars					Dollars		Percent	Ratio
United States	26.3	6.0	30.3	9.2	38	459	1.38	72	3.95
Canada	3.7	2.3	3.8	2.4	92	736	1.65	61	2.57
EC	33.3	32.6	15.6	14.9	46	485	1.45	69	3.23
Other Western Europe	8.8	4.3	6.3	1.9	58	1,073	1.21	82	5.71
Japan	22.6	27.7	5.7	8.6	71	902	1.48	68	3.90
Australia	.6	-.5	1.1	.1	6	130	1.16	86	7.22
New Zealand	.2	-.2	.5	0	3	223	1.05	96	23.00
Industrial market economies	95.4	72.4	63.1	36.9	49	564	1.42	71	3.65

1/ Estimates based on unilateral liberalization by the countries or regions.

2/ Total cost is the sum of producer benefits (+), consumer costs (-), and taxpayers' costs (-), and includes transfers to other groups, for example, quota holders.

Source: SWOPSIM ST86 simulations.

The net economic costs in table 8 do not provide an accurate indication of the total domestic costs associated with distortionary agricultural policies because they do not fully reflect the transfers from consumers and taxpayers to producers. For industrial market economies as a whole, distortionary policies cost consumers and taxpayers more than $135 billion, whereas the welfare losses would be about $37 billion. The cost to consumers and taxpayers is nearly four times the welfare costs.

Most countries pursue protectionist policies to support farm incomes. Since farm population, however, accounts for only a small proportion of total population in most industrial countries, the nonfarm sector provides a large share of the assistance that goes to the agricultural sector. Our study indicates that it annually costs each nonfarm household in industrial market economies more than $500 to maintain agricultural support. This burden of agricultural support programs on the nonagricultural sector is considerably more in Japan than in the United States or the EC. Because Australia and New Zealand have low levels of support, their costs to nonfarm households are considerably lower than in other countries.

The domestic costs of distortionary agricultural policies represent a part of the welfare costs of such policies. Individual countries' policies not only affect producers, consumers, and taxpayers within the country but also those in other countries (table 9). While U.S. policies raise producer incomes by $26 billion, they cost producers in other countries nearly $17 billion because of their price-depressing effects. Most of the costs of U.S. policies are borne by dairy producers in the EC, and by grain and sugar producers in developing countries. Producers in the other remaining countries are not greatly influenced by U.S. agricultural policies.

Table 9--Costs and benefits of agricultural support to producers, 1986-87 1/

From policies of country or region	United States	Canada	EC	Other Western Europe	Japan	Australia	New Zealand	Developing exporters	Centrally planned economies	New industrial Asia	Developing importers	Total costs to others
						Billion dollars						
United States	26.3	-0.7	-7.2	-0.8	-0.5	-0.6	-0.5	-1.1	-2.7	-0.1	-3.2	-17.4
Canada	-.7	3.7	-1.2	-.2	-.1	-.1	-.1	-.2	-.6	0	-.6	-3.8
EC	-8.1	-1.6	33.3	-1.2	-.8	-1.2	-1.1	-2.4	-4.9	-.2	-5.2	-26.7
Other Western Europe	-1.1	-.2	-1.7	8.8	-.1	-.1	-.1	-.3	-.7	0	-.6	-4.8
Japan	-1.2	-.1	-2.0	-.2	22.6	-.2	-.1	-1.3	-1.9	-.2	-2.9	-10.3
Australia	-.2	-.1	-.3	0	0	.6	0	-.1	-.1	0	-.2	-.9
New Zealand	-.1	0	-.1	0	0	0	.2	0	0	0	0	-.1
Total costs of others' policies	-11.3	-2.7	-12.5	-2.5	-1.5	-2.3	-2.0	-5.3	-10.9	-.5	-12.6	-64.0

1/ Benefits (+) of support defined as lost producer surplus from unilateral liberalization scenarios of countries or regions on left.

Source: SWOPSIM ST86 simulations.

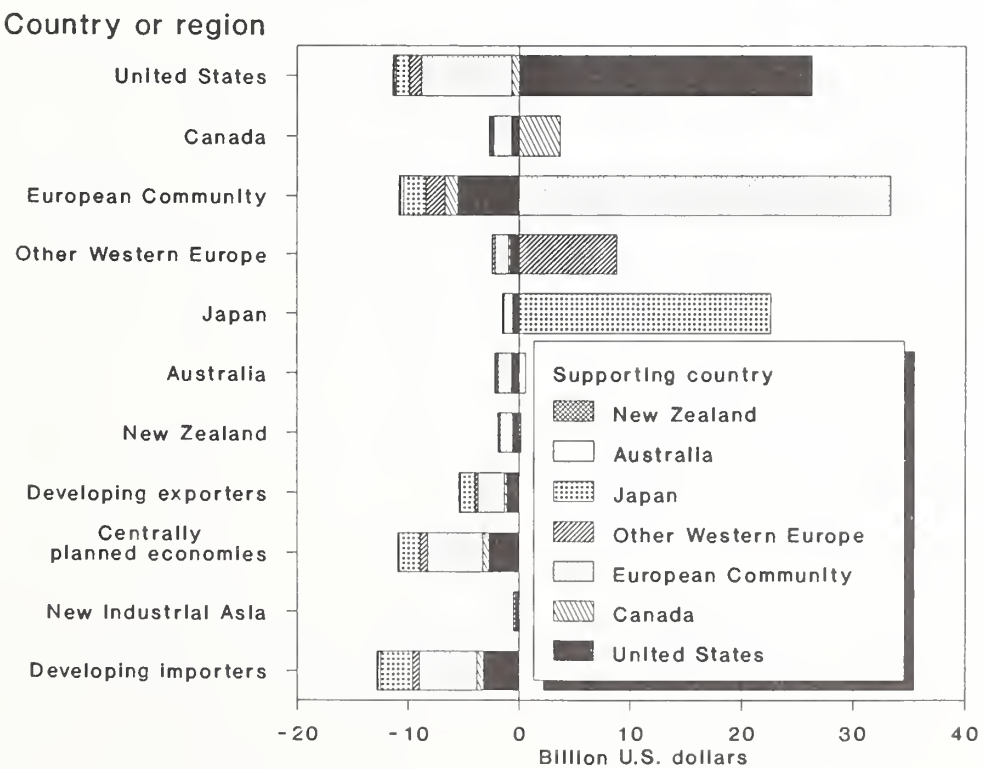
By contrast, EC support policies substantially affect producers in almost every region. The gains to EC producers from their policies ($33 billion) are not much greater than the losses incurred by producers in other industrial countries ($27 billion). The losses are largest for U.S. producers ($8 billion), followed by producers in developing importers ($5 billion), and producers in the other regions ($1 billion to $2 billion each). Most of the losses occur as a result of the EC's distortionary grain and beef policies.

Japanese agricultural policies also substantially cost producers in other countries ($10 billion). Rice producers in developing countries bore more than a third of these costs. Most of the remaining producer costs are incurred by beef, pork, and dairy producers in the United States and the EC.

Policies of Australia, New Zealand, Canada, and Other Western Europe significantly benefit their own producers, but have little effect on producers of other countries. This suggests that these regions either have relatively low levels of protection or account for a small share of world agricultural trade.

One justification for the perpetuation of high levels of farm support is the need to offset losses to domestic producers from protectionist policies of other countries. Our results suggest that such an argument has merit. In the United States, for instance, more than 40 percent of the support to farmers merely offsets the losses created by policies of other industrial market economies (fig. 11). The compensation required to offset losses to producers in Japan and the EC would be much less.

Figure 11
Producer perspective: Costs of other countries' support (-) and benefits (+)



Source: SWOPSIM ST86 simulations.

Because protectionist agricultural policies of industrial countries have encouraged the inefficient use of resources, those economies in the aggregate would gain more than $35 billion annually from multilateral liberalization (table 10). This gain equals about 10 percent of industrial countries' combined agricultural gross domestic product (GDP), but less than one-half of 1 percent of their total GDP. Global real income gains would be slightly less ($30 billion). The EC would be the largest gainer (about $14 billion), followed by the United States ($9 billion) and Japan ($6 billion). These three gains would account for more than 80 percent of the gains to industrial market economies from multilateral trade liberalization. Most of the gains to the United States would come from government budget savings, while those in the EC and Japan would come from consumer savings.

These gains to industrial market economies depend to a large extent on our assumption of the price transmission elasticities for the centrally planned economies and developing countries. If we had assumed smaller price transmission elasticities for those regions, then the increases in world prices following multilateral liberalization would be more, and we would expect the gains to the industrial market economies to be higher. Conversely, if these economies were to take advantage of the increases in world prices and to allow all of it to be transmitted to their domestic economies, then the income gains to the industrial countries would most likely be less.

Table 10--Welfare implications of multilateral trade liberalization by industrial market economies, 1986-87 1/

Country or region	Producer welfare	Consumer welfare	Treasury savings	Net benefits 2/ Total	Net benefits 2/ Per capita
	Billion dollars				Dollars
United States	-16.2	-4.6	30.3	8.6	36
Canada	-1.3	.2	3.8	2.6	101
EC	-22.7	21.2	15.8	14.0	43
Other Western Europe	-6.8	1.8	6.3	1.3	41
Japan	-21.8	24.7	5.7	6.3	52
Australia	1.6	-1.5	1.1	1.1	71
New Zealand	1.7	-.8	.5	1.3	396
Developing exporters	5.1	-4.8	-.3	.7	2
Centrally planned economies	9.8	-10.3	.1	-.8	-1
New industrial Asia	.5	-.9	.1	-.9	-13
Developing importers	11.8	-14.5	-.1	-4.4	-2
Industrial market economies	-65.6	40.9	63.1	35.3	51
Developing countries	17.4	-20.2	-.3	-4.5	-2
Centrally planned economies	9.8	-10.3	.1	-.8	-1
Global	-38.4	10.4	62.8	29.9	7

1/ Estimated change in producer surplus, consumer surplus, net government expenditures, and the sum of all three.

2/ Net benefits include losses by other groups, for example, quota holders.

Source: SWOPSIM ST86 simulation.

On a per capita basis, New Zealand would benefit the most ($396) from multilateral liberalization. Much of the gains in New Zealand would accrue to producers who obtain higher international prices for their exports. The net per capita benefits to the United States ($36), the EC ($43), and Japan ($52) would be relatively low, totaling less than 1 percent of per capita gross national product. U.S., EC, and Japanese gains are low because agriculture's contribution to gross domestic product is very small (about 2 percent each) in these three regions, unlike that for New Zealand (9 percent).

These modest per capita gains, however, should not be used to decry the importance of policy reform. First, the net benefit to a country is small when compared with the transfer of incomes within the country. The income gains to consumers and taxpayers in the United States and the EC are nearly three times the increase in national incomes. In Japan, the ratio is 4 to 1. Another reason for the small gains is the relatively low agricultural net supply elasticities assumed, which imply that resources cannot easily shift away from the sector. If larger elasticities were assumed, then resource movements among sectors would be easier and the gains from liberalization would be larger. This has been well illustrated by Bale and Lutz (1981) in their work on an international comparison of agricultural price distortions.

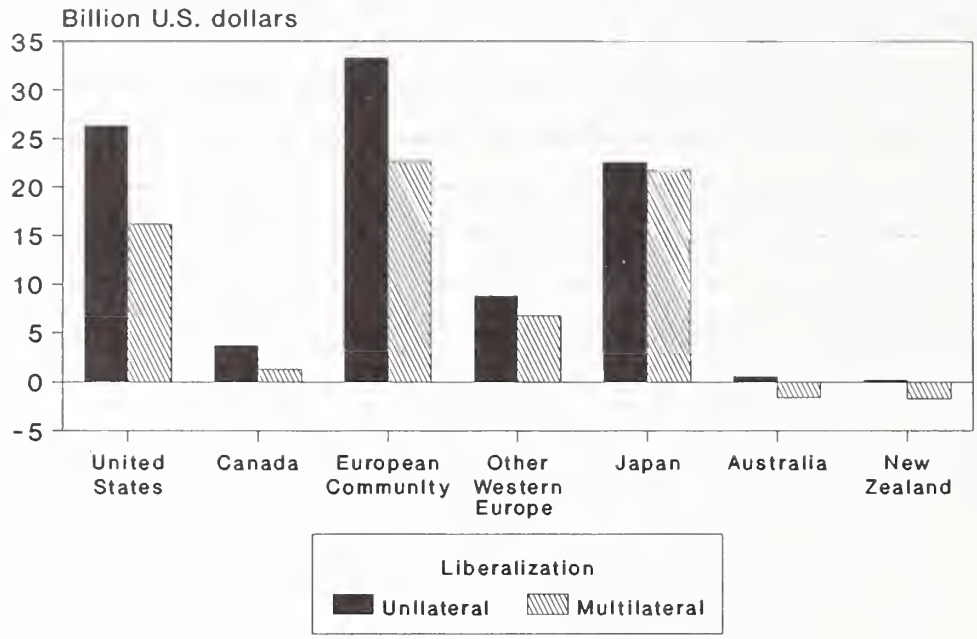
Whether producers gain or lose from multilateral liberalization, and thus require compensation, could be of considerable concern in the new round of international trade negotiations.[13] Our results indicate that producers in the EC, Japan, and the United States could lose between $15 billion and $25 billion with multilateral trade liberalization. Most of these losses result from the elimination of government assistance. Rice producers in Japan, beef producers in the EC, and grain producers in the United States account for most of the losses.

While the losses in producer incomes may appear large, such losses would be even greater if industrial market economies were to attempt unilateral policy reform to redress their budgetary problems. An important feature of our results is that producers would lose much less (or require much less compensation) in a multilateral reduction of support as opposed to unilateral elimination of agricultural assistance, because increases in international prices would be much higher when all countries eliminate support (fig. 12). U.S. producer losses would be cut by nearly 40 percent under multilateral liberalization, while those for the EC would be a third lower. Producers in Japan, in contrast, would lose about the same under either scenario because Japanese agricultural support levels (PSE's) are high compared with those of other countries.

The United States and the EC clearly have greater incentives to enter into a multilateral agricultural policy reform agreement than does Japan. Much less

13/ Losses by producers could presumably be compensated for by decoupled payments as stated in the U.S. proposal (Rossmiller, 1988), especially if losses to producers are less than government expenditures on farm programs. In the case of the United States, even if all losses in producer incomes are compensated for, the savings to the Treasury would still be $14 billion (table 10).

Figure 12
Compensation requirements for multilateral and unilateral liberalization



Source: SWOPSIM ST86 simulation.

compensation would be required to maintain income levels if all countries simultaneously removed agricultural support.[14]

Producers, consumers, and taxpayers in developing countries would also be affected by agricultural trade liberalization by industrial market economies (table 10). The effect is through changes in world market prices. Food-importing developing countries, such as India, Nigeria, or even Taiwan and South Korea, would lose with higher world prices. The increases in cost of food and fiber to consumers in these countries would be more than the income gains to farmers. In contrast, developing countries that are agricultural exporters, such as Argentina and Brazil, would gain from multilateral industrial country liberalization because increased income from agricultural exports would more than offset the higher food costs to consumers. Since developing countries as a whole are net importers of agricultural products included in our model, these countries would lose nearly $5 billion from multilateral trade liberalization by industrial market economies.

Limitations of the Analysis

Since the forces influencing trade are constantly changing, the economic implications of trade liberalization are likely to differ depending on the study

14/ The actual compensation required may be less than the producer income losses shown by our results because, in reality, part of the transfer goes to upstream and downstream activities.

period. In comparing the results of this study with an earlier study (Roningen and Dixit, 1987) that used the 1984-85 marketing year as the base, we found that liberalization of policies by industrial market economies would have increased world agricultural prices much more under 1986-87 market conditions than under 1984 conditions (fig. 13). The price increases would be especially large for wheat, coarse grains, and rice because levels of protection on grains rose rapidly during the two periods compared with protection levels for other products. Similarly, the real income gains from liberalization would be larger under 1986-87 conditions than under 1984-85 conditions simply because agricultural protectionism, measured as the weighted average of PSE's across commodities and countries, rose between these two periods. Changes in the market structure would considerably affect the outcome of trade liberalization.

Furthermore, our model deals with only a subset of agricultural products. Most notable among the omissions are tropical products, which account for nearly half of global agricultural trade value. Producers of these commodities tend to be taxed in developing countries but protected in industrial market economies. Their inclusion in our model would increase the benefits of agricultural trade liberalization to developing countries. Our conclusions on the implications of industrial market economy trade liberalization to developing countries are more applicable to developing exporters, such as Argentina, because a large portion of their agricultural trade is accounted for by commodities included in the model.

Our model provides a very naive interpretation of the world agricultural market. It does not recognize the substantial product differentiation among the broad commodity aggregates we use. Hard high-protein wheat exported by the United States, for example, is very different from soft low-protein wheat exported by the EC. The model also does not take into account institutional rigidities and politics. The failure to recognize some of these real world complexities could have different implications than suggested by our model.

The model results are based on the assumption that the centrally planned economies do not change their policies as a result of higher world prices. If policies change, the results could change. This is especially true in the grain sector, where centrally planned economies account for a substantial portion of world trade.

The true benefits to society from multilateral liberalization are likely underestimated in a model like ours. Our costs do not include the expenses incurred by farm groups lobbying to support farmers or other groups seeking to reduce food costs. In addition, the costs associated with the greater instability of international prices generated by distortionary policies are not taken into account. These costs, however, are likely very small.

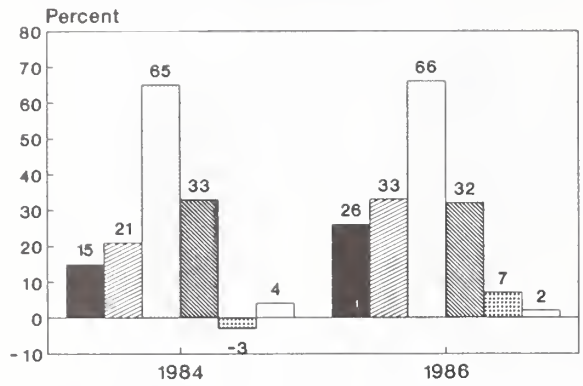
Our results are generated from a partial equilibrium intermediate-run model, which assumes that factor prices are fixed. This assumption implies that the agricultural sector faces an infinitely elastic supply of factors. While this assumption may hold for capital, it is much less likely to be true for labor, especially in the short run, and land.[15] A general equilibrium model could

15/ Land prices are certainly not fixed with respect to agricultural policy, but this assumption may not create much of a problem if agricultural land has no alternative use and if its return is pure rent.

Figure 13

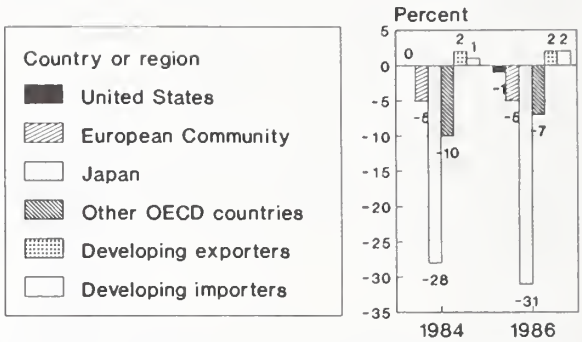
Comparison of 1984 and 1986 industrial market economies' liberalization scenarios

Average support levels (PSE's)



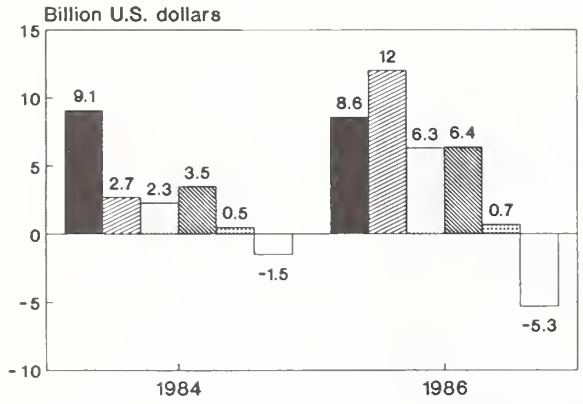
Index weighted by base production value.

Change in production levels

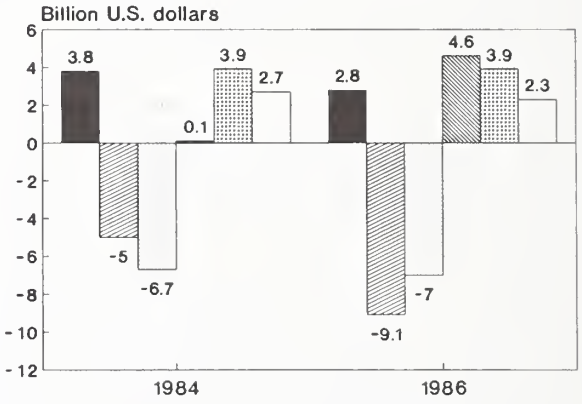


Index weighted by base production value.
Other OECD countries = Canada, Other Weatern Europe, Australia, New Zealand.

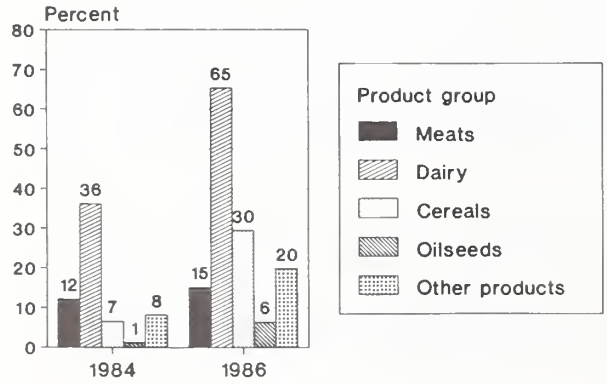
Change in welfare



Change in trade balance

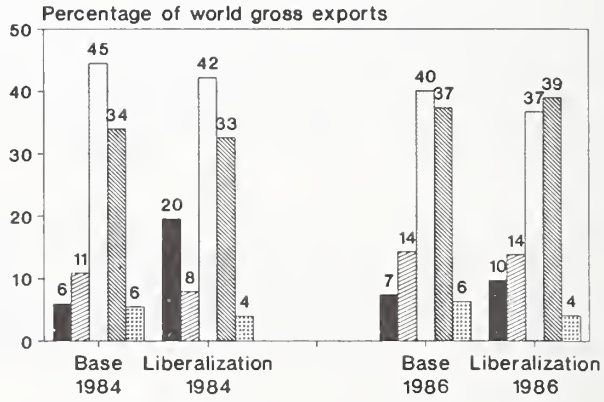


Increase in world prices



Index weighted by base world production.

U.S. export shares



Source: SWOPSIM ST84 and ST86 multilateral liberalization simulations.

examine resource shifts between agriculture and the rest of the economy, and could provide greater insights about the effects of agricultural liberalization on other sectors, factor markets, and balance of payments. These effects, as pointed out in a number of recent studies, could be substantial.

Stoeckel and Breckling (1988) show that agricultural protection in the EC has contributed to deindustrialization in Europe, lowering manufacturing output by 1.2 percent and directly costing the EC between 2 million and 4 million jobs. Hertel, Thompson, and Tsigas (1988) similarly illustrate the substantial nonfarm costs to support U.S. agriculture. To keep one farm job in agriculture, they say, the nonfarm economy gives up $107,000 in nonfood output. To the extent that the effects on the nonagricultural sector are not taken into account in our modeling effort, our study possibly understates the benefits to society from agricultural liberalization.

How would factor markets be influenced by agricultural liberalization? Economic theory suggests that price supports alone cannot influence wages and returns to capital in agriculture because, in the long run, capital and labor are mobile between sectors. A rise in agricultural prices encourages agricultural production and increases demand for all factors of production in that sector. Because agriculture is small compared with the rest of the economy, labor and capital can be attracted without changes in factor prices. This, however, would not be the case with land. Agricultural land is basically fixed in supply, so its price is bid up with increases in output prices. Thus, in the long run, the benefits of farm support accrue not to labor and capital but to landowners at the time the farm policies were introduced. Some farmers own land and benefit accordingly, but many farmers do not and end up paying higher rents from price supports (Winters, 1987).

Robinson, Adelman, and Kilkenny (1988) report that unilateral liberalization of U.S. agricultural policies could lower use value of land by as much as 34 percent. Hertel, Thompson, and Tsigas (1988) point out that U.S. farm policies may have created capitalized value of landowner gains of up to $114 billion, more than four times greater than our $25-billion estimate for the income loss to U.S. producers of eliminating farm programs. If one believes that many of the benefits of government support programs arise from an appreciation in land values, then the adjustment costs to landowners of eliminating such programs could be greater than those reported in this study.

What about the effects of liberalization on family farms and the structure of farming? The largest 30 percent of U.S. farms receive nearly 90 percent of direct government payments to agriculture, while 25 percent of farmers in the EC receive 75 percent of the assistance offered by the Commmon Agricultural Policy (CAP). Moreover, evidence in both regions indicates that even with government programs, the number of farms has been rapidly declining, while the size of holdings has been increasing. One could argue that government programs may have arrested the decline in family farms by enabling high-cost producers to remain in agriculture.[16] Indeed, if this were true, any elimination of government programs could force the marginal producer to exit farming, leading to larger and more efficient farms. Yet, despite this possibility, it appears highly unlikely that elimination of government subsidies would

16/ Others argue that government programs have raised the cost of production and accelerated the exodus of small farmers from agriculture.

substantially affect the financial survival of most farms currently in the sector, given that adjustments are occurring in agriculture, especially U.S. agriculture, in response to declining profitability. The structure of agriculture may change, but this would more likely be a continuation of trends in the 1980's rather than the direct result of agricultural liberalization. The changes that occur directly from liberalization would be confined more to factor use and the nature of farming--intensive versus extensive farming--rather than to solvency and farm structure.[17]

Our model also does not fully capture the long-term effect of liberalization on economic efficiency. The gains we reported are primarily medium-term gains. In the longer run, investment and research efforts can be redirected and technology can be changed. The rate and extent to which factors of production can move between alternative economic activities would be critical in determining the longrun dynamic efficiency gains from liberalization.

Lucas (1976) argued that models estimated using data under past policy regimes may not be relevant to current or future market conditions. This issue is of special concern when large shocks like trade liberalization occur. Should policy regimes change drastically, as would be the case with trade liberalization, a model based on historical parameters may not quite give us the correct story.

Other studies, however, generally confirm the results we get for trade liberalization even though different models are used. Magiera and Herlihy (1988) show that most prominent studies get similar patterns of world price changes with liberalization, and that a SWOPSIM model can obtain similar world price changes if it uses support levels from those studies (fig. 14).

Furthermore, Magiera and Herlihy (1988) show that the support levels are the most important elements in determining the degree of world price change with liberalization. Studies using higher levels of support tend to get larger world price changes and associated effects (fig. 15). Moreover, as shown by Kilkenny and Robinson (1988), our results, derived from a partial equilibrium model, are also broadly consistent with results obtained from a Computable General Equilibrium model that takes a longer term outlook.

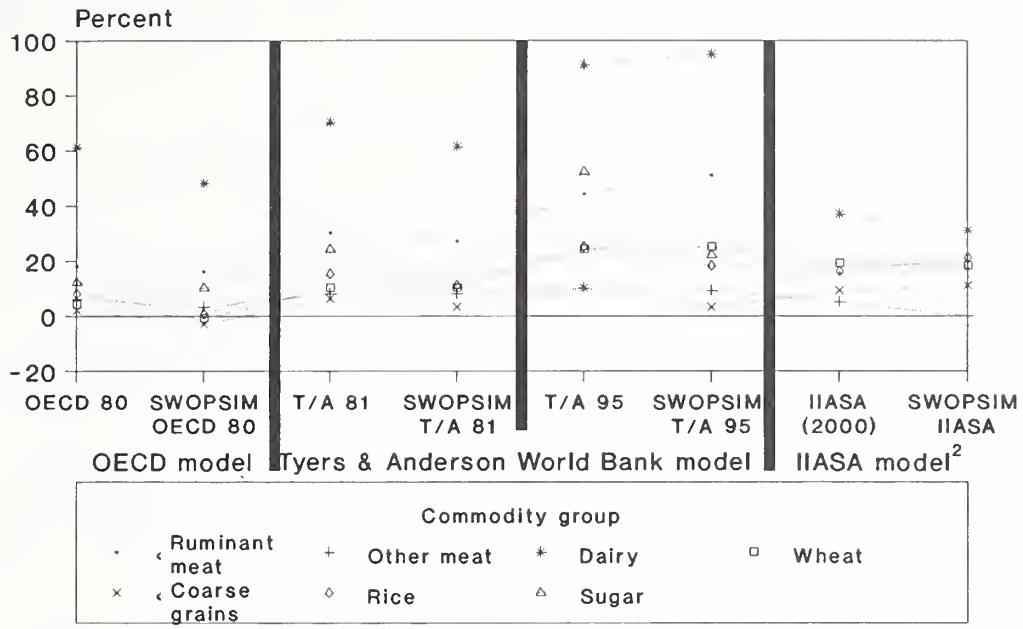
What We Learned

Recently, there has been growing concern about the costs of protectionist agricultural policies and the potential benefits that would accrue if countries multilaterally eliminated assistance to agriculture. Our results suggest that such concerns are justified because current policies have introduced substantial distortions into the domestic and international marketplace.

Consumers and taxpayers have had to bear the burden of support to agricultural producers. Where the support has been financed through budgetary measures, the costs have been apparent. In other instances, where support has originated through production controls or other similar price-enhancing

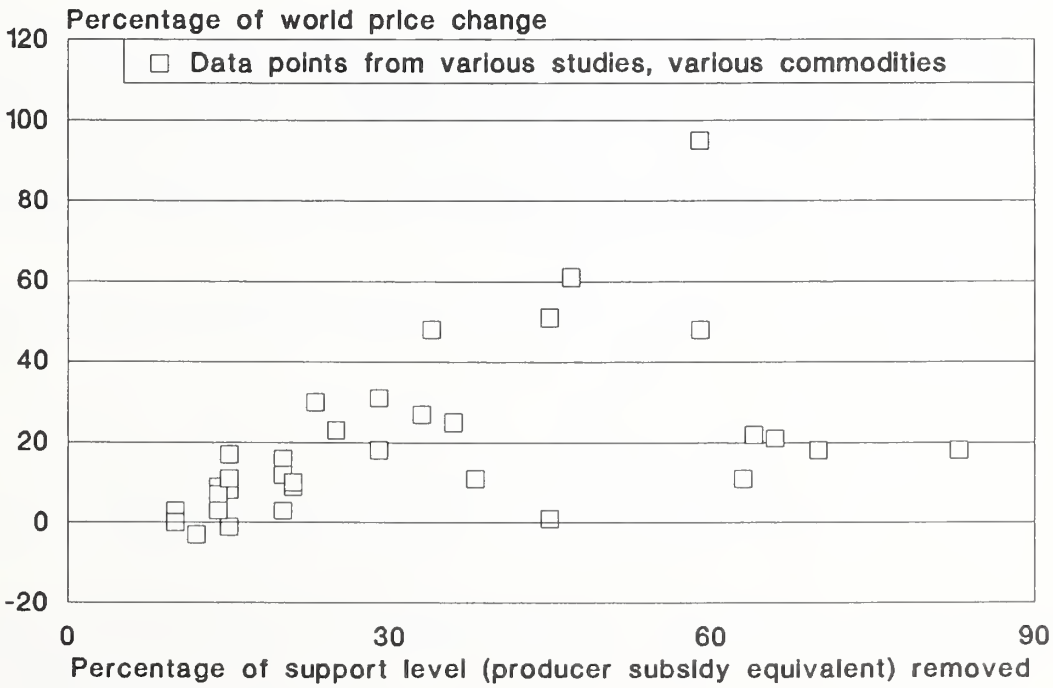
17/ Because the price of land would be lower compared with labor and capital, one would expect that with trade liberalization, there would be a tendency for extensive farming.

Figure 14
World price changes due to liberalization, from selected studies[1]



[1]Effects across studies are shown by the commodity line. Effects of the same support level in the original model and the SWOPSIM version are shown *between* the bars.
[2]Discussed in Parikh, Fischer, Frohberg, and Gulbrandsen (1988).
Source: Magiera and Herlihy (1988).

Figure 15
Scatter diagram of world price changes versus support levels



Source: Magiera and Herlihy (1988).

measures, the costs are hidden. Nevertheless, the costs to consumers and taxpayers in most countries outweigh the benefits to producers, generating real income losses domestically and globally. Our results suggest that policies used by industrial market economies to transfer resources between the farm and the nonfarm sectors are inefficient, and that less distortionary and wasteful alternatives could be devised to achieve the same farm income objectives.

The incentives for liberalization vary widely across countries. On a per capita basis, Australia and New Zealand have a lot to gain from any liberalization effort. It is, therefore, not surprising that these two countries have been in the forefront of the international effort to reverse the proliferation of agricultural protectionism. The incentives for the United States and the EC originate not necessarily from the potential real income gains from multilateral liberalization, but rather from the need to curtail escalating costs of farm programs. Elimination of agricultural assistance could go a long way in reducing government deficits and lowering trade tensions among political allies. For Japan, the incentive for liberalization rests on consumer well-being. Whether this is a realistic motivation, however, remains to be seen. History suggests that Japanese consumers are willing to sacrifice for the well-being of agricultural producers, and that there might not be sufficient domestic political pressures for substantial policy reform.

The story for developing countries is complex because of the diversity in their economies as well as in their policy regimes. Developing exporters, such as Argentina and Brazil, would benefit immensely from any increases in world prices. Liberalization that leads to higher prices could hurt most developing countries, which are net importers of food products. This suggests that industrial market economy liberalization might be more acceptable to developing countries if accompanied by increased development assistance or trade concessions in other areas.

The world agricultural playing field is not very level. Any policy reform, therefore, will inevitably generate both winners and losers. Our objective in this report was to provide a quantitative assessment of the potential gains and losses from multilateral trade liberalization. We infer from our analysis that multilateral liberalization would primarily benefit consumers and taxpayers at the expense of producers, and that adjustment costs to the farm sector could be minimized if countries simultaneously, rather than unilaterally, liberalized their agricultural policies.

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☆U.S. Government Printing Office : 1990 - 261-455/20029

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